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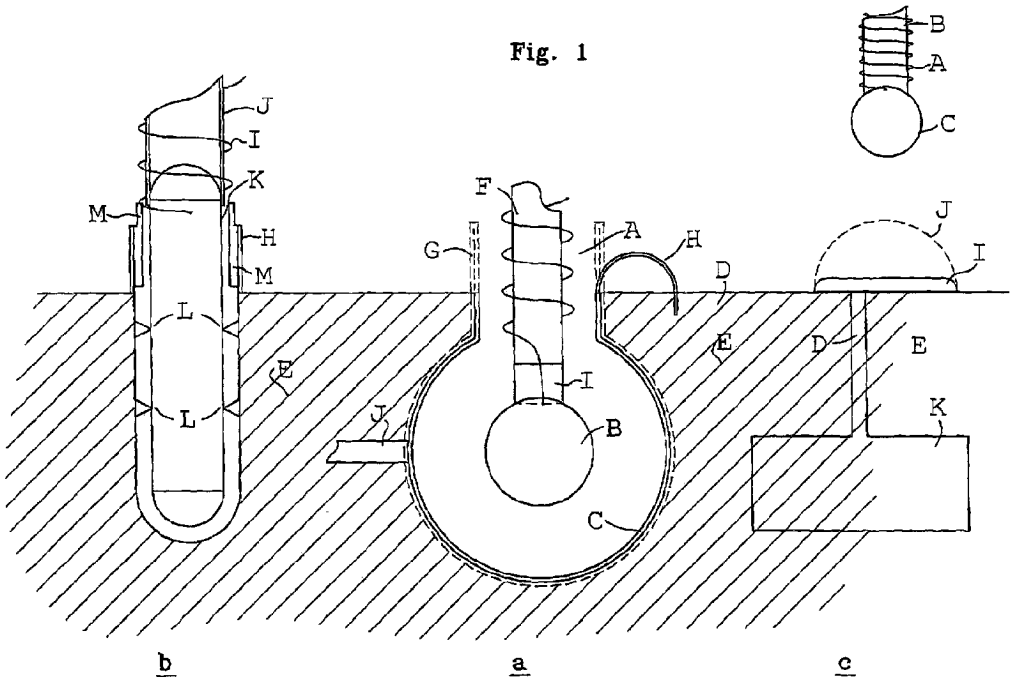
(54) **Titre : SYSTEME DE DISTRIBUTION DE PUISSANCE SANS FIL**
(54) **Title: SYSTEM FOR WIRELESS DISTRIBUTION OF POWER**

Fig. 1



(57) **Abrégé/Abstract:**
A wireless power transmission system comprising a transmitting inverted Tesla Coil or Magnifier connected to the ground by its high voltage terminal using a capacitive earth connection and transmitting power through the ground to a subsequent receiving Tesla Coil or Magnifier being well earthed through a capacitive earth connection or conventional earth with the distance between the two earth connections of the transmitter and receiver plus the length of the coils in the transmitter and receiver forming a tuned length and the system thus composed being operated at a frequency that is an harmonic or close to an harmonic of the tuned length thus established.

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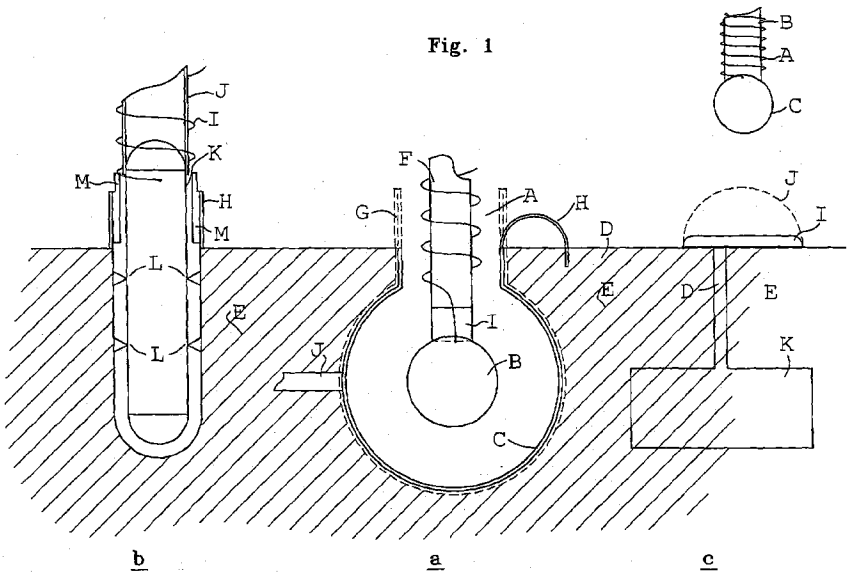
(54) **Title**: SYSTEM FOR WIRELESS DISTRIBUTION OF POWER

Fig. 1



(57) **Abstract**: A wireless power transmission system comprising a transmitting inverted Tesla Coil or Magnifier connected to the ground by its high voltage terminal using a capacitive earth connection and transmitting power through the ground to a subsequent receiving Tesla Coil or Magnifier being well earthed through a capacitive earth connection or conventional earth with the distance between the two earth connections of the transmitter and receiver plus the length of the coils in the transmitter and receiver forming a tuned length and the system thus composed being operated at a frequency that is an harmonic or close to an harmonic of the tuned length thus established.

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AMENDED CLAIMS

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CLAIMS

1. A wireless power transmission system comprising:
a transmitting inverted Tesla Coil or Magnifier connected to the ground by its high voltage terminal using a capacitive earth connection and transmitting power through the ground to a subsequent receiving Tesla Coil or Magnifier being well earthed through a capacitive earth connection or conventional earth with the distance between the two earth connections of the transmitter and receiver plus the length of the coils in the transmitter and receiver forming a tuned length and the system thus composed being operated at a frequency that is an harmonic or close to an harmonic of the tuned length thus established.

2. A system as claimed in 1 where the inverted Tesla coil or Magnifier has a large capacitance on an elevated terminal which becomes a high current low-voltage node and is used as the neutral side during power transmission.

3. A system claimed in 1 where the coils are caused to impress voltage through their high voltage terminal onto the ground through air separation or using any of the capacitive earthing devices mentioned in the text or shown in the drawings hereto or any other efficacious capacitive connection method.

4. A system as claimed in claim 1 where the transmitting inverted Tesla Coil or Magnifier is brought into resonance with a second receiving Tesla Coil or Magnifier to maximize the amount of energy available in the receiving Tesla Coil or Magnifier.

5. A system as claimed in claim 4 where additional Tesla Coils or Magnifiers are added for transmission and reception of power by having each of them being located in a triangular grid pattern so that the transmitters and receivers that are within range of each other all use the same frequency or a harmonic of each others frequency augmenting the action of the other transmitters and receivers.

6. A system as claimed in claim 5 where longer distance transmission is achieved by using lower frequencies.

7. A system as claimed in claim 5 where shorter distance transmission is achieved by using higher frequencies

8. A system as claimed in claim 6 and 7 where the frequencies used for longer or shorter distances are an harmonic of one another.

9. A system where the method of single conductor power transmission is used to develop AC current and subsequently transmit the power through the earth to a receiver so that the energy at the receiver is rendered useable.

10. A system where an oscillating LCR or LC circuit of any description is used to develop AC current which is transmitted through the earth to a receiver using an LCR or LC circuit of any description as a single conductor power transfer system with which to transmit power wirelessly from one location to another using the earth as a single conductor to do so.

11. A system as claimed in claim 9 or 10 where the LCR or LC circuit of the transmitter and the LCR or LC circuit of the receiver is brought into resonance with each other.

12. A system claimed in any previous claim where more than one power transmission and reception system may operate contemporaneously with another power transmission and reception system and not interfere with one another as each system is built to operate at a different discrete frequency so that neither power transmission system interferes with the operation of the other allowing discrete power generation and transmission to occur to allow commercial competition.

13. A system claimed in any previous claim where power transmission on discrete frequencies is allocated to transmission and receiving power stations so that civilian power may run on one frequency and the defence forces may run on another frequency so that in the event that the civilian power grid goes down, the defence power grid still remains in tact.

14. A wireless power transmission system comprising:
a transmitter coil connected to the ground by its high voltage terminal using a capacitive earth connection and transmitting power through the ground to a subsequent receiving coil;
the subsequent receiving coil being well earthed through a capacitive earth connection or conventional earth.

15. The system of claim 14, wherein with the distance between the earth connection of the transmitter coil and the earth connection of the receiving coil plus the length of the coils in the transmitter and receiver forming a tuned length and the system thus composed being operated at a frequency that is an harmonic or close to an harmonic of the tuned length thus established.

16. The system of claim 14 or 15 wherein the transmitter coil has a large capacitance on an elevated terminal which becomes a high current low-voltage node and is used as the neutral side during power transmission.

17. The system of any one of claims 14 to 16 wherein the coils are caused to impress voltage through their high voltage terminal onto the ground.

18. The system of claim any one of claims 14 to 18 wherein the transmitting coil is brought into resonance with the receiving coil to maximize the amount of energy available in the receiving coil.

19. The system of claim any one of claims 14 to 18 further including at least one additional coil for transmission and reception of power wherein the at least one additional coil is located in a triangular grid pattern so that the transmitter coil and receiver coil that are within range of each other all use the same frequency or a harmonic of each others frequency augmenting the action of the other transmitters and receivers.

20. The system of claim any one of claims 14 to 19 wherein longer distance transmission is achieved by using lower frequencies.

21. The system of claim any one of claims 14 to 19 where shorter distance transmission is achieved by using higher frequencies.

22. The system of claim 20 wherein the frequencies used for the longer distances are an harmonic of one another and of the shorter distance frequencies.

23. The system of claim 21 wherein the frequencies used for shorter distances are an harmonic of one another and of the longer distance frequencies.

24. A wireless power transmission system wherein single conductor power transmission is used to develop AC current and subsequently transmit power through the earth to a receiver so that the energy at the receiver is rendered useable.

25. The system of claim 24 wherein the oscillating LCR or LC circuit of the transmitter and the LCR or LC circuit of the receiver is brought into resonance with each other.

26. A wireless power transmission system wherein an oscillating LCR or LC circuit is used to develop AC current which is transmitted through the earth to a receiver using an LCR or LC circuit as a single conductor power transfer system with which to

transmit power wirelessly from one location to another using the earth as a single conductor to do so.

27. The system of claim 26 further including at least one capacitive connection associated with an earth connection.

28. The system of claim 26 or 27 wherein the oscillating LCR or LC circuit of the transmitter and the LCR or LC circuit of the receiver is brought into resonance with each other.

29. A system claimed in any previous claim where more than one power transmission and reception system may operate contemporaneously with another power transmission and reception system and not interfere with one another as each system is built to operate at a different discrete frequency so that neither power transmission system interferes with the operation of the other allowing discrete power generation and transmission to occur to allow commercial competition.

30. A system claimed in any previous claim where power transmission on discrete frequencies is allocated to transmission and receiving power stations so that civilian power may run on one frequency and the defence forces may run on another frequency so that in the event that the civilian power grid goes down, the defence power grid still remains in tact.

31. A system claimed in any previous claim wherein once the carrier wave is established in the earth between two points, the wave can then be overlaid with data signals using frequencies that are higher or lower harmonics of the carrier frequency whereby the system may be used for Data, signal, voice Transmission as well as power transmission.

32. A method of forming a tuned network from at least one first coil assembly and an at least one second coil assembly; the method comprising:

connecting a capacitor between the at least one first coil assembly and earth, and the at least one second coil assembly and earth, such that a tuned path is formed through the earth between the at least one first coil assembly and the at least one second coil assembly, when at least one of the at least one first coil assembly or second coil assembly is excited at a predetermined frequency.

33. The method of claim 32, wherein the capacitor is formed from a first metal plate and at least a second metal plate.

34. The method of claim 33, wherein the first metal plate is formed as a substantially closed volume.

35. The method of claim 34, wherein the substantially closed volume is a sphere.

36. The method of claim 32 or 34 wherein the first metal plate is substantially enclosed by the second metal plate.

37. The method of any one of claims 32 to 36 wherein the second plate is located within the earth.

38. The method of any one of claims 31 to 37 wherein the first plate is located at or near an earth/air interface.

39. A method of earthing oscillating coils through a capacitive connection to the earth so that AC earth electrical currents will be developed when the capacitive connection is excited with AC electrical energy.

40. The method of claim 39 wherein a plurality of oscillating coils are used as transmitters, then electrical currents flow between the connections facilitating wireless power transmission through the ground where the currents are available to be accessed by receivers and converted to useable energy.

41. A method of maximizing potential between a first coil connected capacitively to a first earth terminal and a second coil connected capacitively to a second earth terminal; the first earth terminal spaced from the second earth terminal; the method including the step of:

exciting at least the first coil at a predetermined frequency which maximizes the voltage difference between at least a portion of the first coil and at least a portion of the second coil.

42. The method of any one of claims 32 to 41 wherein once a carrier wave is established in the earth between two points, the wave is then overlaid with data signals using frequencies that are higher or lower harmonics of the carrier frequency whereby the system may be used for Data, signal, voice Transmission as well as power transmission.

43. The method of any one of claims 32 to 42 wherein once a carrier wave is established in the earth between two points, the wave is then overlaid or varied to induce data signals for transmission thereover.

44. The method of claim 43 wherein the wave is overlaid using any method of Frequency Modulation, Frequency Shift Keying, Encoding or any other technology currently extant whereby the system may be used for Data, signal, voice Transmission as well as power transmission.

45. The method of claim 43 or 44 wherein once the carrier wave is established in the earth between points then the frequency may be varied using a pre-programmed input.

46. The method of claim 45 wherein the pre-programmed input frequently shifts the frequency of transmission thereby making it very difficult to tune into the system with a receiver, unless one

has access to the pre-programmed transmission frequency input sequence so that the next frequency shift can be anticipated and tuned synchronously with the tuning shift in the transmitter.

47. A wireless power transmission system as claimed in any one of claims 1 to 31 wherein once a carrier wave is established in the earth between two points, the wave is then overlaid or varied to induce data signals for transmission thereover.

48. The system of claim 47 wherein the wave is overlaid using any method of Frequency Modulation, Frequency Shift Keying, Encoding or any other technology currently extant whereby the system may be used for Data, signal, voice Transmission as well as power transmission.

49. The system of claim 47 or 48 wherein once the carrier wave is established in the earth between points then the frequency may be varied using a pre-programmed input.

50. The system of claim 49 wherein the pre-programmed input frequently shifts the frequency of transmission thereby making it very difficult to tune into the system with a receiver, unless one has access to the pre-programmed transmission frequency input sequence so that the next frequency shift can be anticipated and tuned synchronously with the tuning shift in the transmitter.

51. A system of wireless transmission that may be constructed with reference to the drawings and/or descriptions and information contained in the body of this document.

52. A coil structure for low impedance transmission of electrical current; said structure comprising

a first coil set comprising a first conductor having a first end and a second end; said first conductor wound around a first core in a first direction;

said structure further comprising a second coil set comprising a second conductor having a first end and a second end; said second conductor wound around a second core in a second direction;

said structure further comprising a primary coil;

said first coil set oriented with respect to said second coil set so that when the coils are in operation the magnetic field generated by one coil is off set by the magnetic field in the other coil set thereby substantially nullifying the RF magnetic output of the said one coil; said primary coil comprising a conductor having a first end and a second end; the conductor of said primary coil wound in a first direction around said first coil set;

the conductor of said primary coil wound in a second direction around said second coil set

thereby to improve efficiency of transmission of electrical power through a medium located between like coil structures.

53. The coil structure of Claim 52 wherein the first coil set is wound as a secondary coil in electrical communication with a tertiary coil.

54. The coil structure of Claim 52 or 53 wherein said second coil set is wound as a secondary coil in electrical communication with a tertiary coil.

55. The coil structure of any one of claims 52 to 54 wherein said second direction is an opposite direction of winding compared to the first direction.

56. A wireless power transmission system comprising a transmitting Tesla Coil or Magnifier connected to the ground being well earthed and transmitting power through the ground to a subsequent receiving Tesla Coil or Magnifier also being well earthed with the distance between the two earths of the Tesla Coils or Magnifiers plus the length of the coils connected to

earth in the transmitter and receiver forming a tuned length and the system thus composed being operated at a frequency that is an harmonic of the tuned length thus established.

57. A system as claimed in claim 56 where the transmitting Tesla Coil or Magnifier is brought into resonance with a second receiving Tesla Coil or Magnifier to maximize the amount of energy available in the receiving Tesla Coil or Magnifier.

58. A system as claimed in claims 56 or 57 where additional Tesla Coils or Magnifiers are added for transmission and reception of power by having each of them being located in a triangular grid pattern so that the transmitters and receivers that are within range of each other all use the same frequency or a harmonic of each others frequency thereby augmenting the action of the other transmitters and receivers.

59. A system as claimed in claim 58 where longer distance transmission is achieved by using lower frequencies.

60. A system as claimed in claim 58 where shorter distance transmission is achieved by using higher frequencies.

61. A system as claimed in claim 8 or 9 where the frequencies used for longer or shorter distances are an harmonic of one another.

62. A system where the method of single conductor power transmission is used to develop AC current and subsequently transmit the power through the earth to a receiver so that the energy at the receiver is rendered useable.

63. A system where an oscillating LCR or LC circuit of any description is used to develop AC current which is transmitted through the earth to a receiver using an LCR or LC circuit of any description as a single conductor power transfer system

with which to transmit power wirelessly from one location to another using the earth as a single conductor to do so.

64. A system as claimed in claim 63 where the LCR or LC circuit of the transmitter and the LCR or LC circuit of the receiver is brought into resonance with each other.

65. A system as claimed in any one of claims 56 to 64 where multiple counter wound coils are used to reduce magnetic radiation emissions from the resonating coil system.

66. A system as claimed in any one of claims 56 to 65 where multiple counter wound coils are brought within close proximity to each other to vary both the capacitance and inductance or are moved apart to vary both the capacitance and inductance in the coil system for tuning purposes.

67. A system as claimed in any one of claims 56 to 66 where more than one power transmission and reception system may operate contemporaneously with another power transmission and reception system and not interfere with one another as each system transmits electrical power utilizing transmission waves at a different discrete frequency so that neither power transmission system interferes with the operation of the other allowing discrete power generation and transmission to occur to allow commercial competition.

68. A system as claimed in any one of claims 56 to 67 where power transmission on discrete frequencies is allocated to transmission and receiving power stations so that civilian power may run on one frequency and the defence forces may run on another frequency so that in the event that the civilian power grid goes down, the defence power grid still remains intact.

SYSTEM FOR WIRELESS DISTRIBUTION OF POWER

FIELD OF INVENTION

[0001] The present invention relates to a method of earthing oscillating electric coils through a capacitive connection to the earth so that AC earth currents will be developed when the capacitive connection is oscillated with AC electrical energy. When two or more oscillating coils are used as transmitters then electrical currents flow between the capacitive connections to the earth of the coils facilitating wireless power transmission through the earth. Receivers may then utilize the electrical current to take power from the earth. This is facilitated by a new coil operating paradigm.

BACKGROUND

[0002] Any discussion of the prior art throughout the specification should in no way be considered as an admission that such prior art is widely known or forms part of common general knowledge in the field.

[0003] Oscillating coils, particularly Tesla coils and Magnifiers have long since been used to produce high AC voltages and currents. A typical Tesla coil has an impedance of some 50,000 Ohms, however the earth impedance at certain frequencies may approach zero. This represents a very poor impedance match for the Tesla coil or any other oscillating coil that is trying to get decent power transfer to the earth since virtually all power is returned to the transmitter in the return phase due to lack of load resistance. It is important that the transmitter coil and the load must have the same impedance for the efficient transfer of power into the load in conductively connected apparatus, in this case, into the ground as a conduit between the transmitter and the load with the total impedance in the load plus ground impedance equalling the impedence in the transmitter coil. The result of this is that transmission of energy through the ground using these devices has been limited in range as the path of least resistance for the return current is to the coil itself. It is simply impossible to get power into the ground using grounded coils since at the point of power injection to the ground the voltage is virtually zero and since Power = VI very little power transfer takes place. Transmission is overcome by reverse currents forming as there is no voltage to speak of to drive the currents further though the ground. The current and voltage are also out of phase where these coils are traditionally earthed, at the bottom of the coil and this makes the power transfer even more difficult.

[0004] In the conventional connection, the coil is connected to the earth at one end so the impedance in the coil capacitor pair would normally have to be matched for transmission to take place efficiently the same as applies to radio which is impossible with existing coil design since for efficient transfer the impedance of the load should equal the impedance of the transmitter thus if we have an impedance of zero we can get no power into the transmitter when the apparatus is operated using the current paradigm.

[0005] It would be a great advance in this area of endeavour if a suitable earthing system could be devised for Tesla coils or Magnifiers in particular, but also oscillating coils in LC or LCR systems in general to allow the energy transfer of the current and voltage transmitted between two or more locations on the earth to be efficient and in phase.

[0006] Nikola Tesla in his US Patent No 645,576 issued 20 March 1900 disclosed a system and method for transmitting electrical energy through a natural media. In particular forms, the propagation of electrical energy is by conduction through air strata however the disclosure of this patent contemplates adjustment of at least frequency and voltage with a view to adjusting the extent to which electrical energy is passed through the air or through the earth. The specification and drawings of US Patent No 645,576 are incorporated herein in their entirety by cross reference.

[0007] Broadly, the Tesla system comprised a step up transformer arrangement in electrical communication with an earth terminal and an 'elevated' terminal. When referenced in later art – for example see US Patent No 7,960,867 issued 14 June 2011 to Issa et al, this arrangement is collectively termed the emitter. The step up coil arrangement is also termed a Tesla coil or a Tesla resonator. The emitter transmits electrical energy wirelessly through media including earth and earth's atmosphere to a receiver which comprises a second Tesla resonator or step down arrangement in communication with an earth terminal and an 'elevated' terminal.

[0008] Attempts continue to this day to transfer efficiently substantial amounts of electrical energy wirelessly broadly in accordance with this mechanism.

[0009] In that regard, for example, US Patent No 7,960,867 referred to above, issued to Issa et al discloses a particular arrangement for a transmitter and emitter. The entire disclosure of US Patent

No 7,960,867 is incorporated herein by cross reference and including the prior art references referred to therein.

[0010] An unverified report from AFP (Agence France-Presse) dated in 2008 indicates that Intel powered a 60 Watt light bulb utilising a wireless energy resonant link reliant primarily on magnetic field leakage rather than electric field leakage. This approach using substantially entirely induction has severe transmission distance limitations.

[0011] It is an object of the embodiments of the present invention to provide a system for wireless distribution of power which addresses or ameliorates one or more of the above mentioned disadvantages.

Notes

[0012] The term "comprising" (and grammatical variations thereof) is used in this specification in the inclusive sense of "having" or "including", and not in the exclusive sense of "consisting only of".

[0013] The above discussion of the prior art in the Background of the invention, is not an admission that any information discussed therein is citable prior art or part of the common general knowledge of persons skilled in the art in any country.

SUMMARY OF THE INVENTION

[0014] Accordingly it is the object of the present invention to provide an earthing method that allows oscillating coils to connect to the earth in a way that maximizes their power input to the ground to allow better efficiency in power transfer and allow power transmission to be conducted economically through the earth without wires. This is facilitated by a new coil operating paradigm.

[0015] In a broad form of the invention there is provided, a wireless power transmission system comprising: a transmitting inverted Tesla Coil or Magnifier connected to the ground by its high voltage terminal using a capacitive earth connection and transmitting power through the ground to a subsequent receiving Tesla Coil or Magnifier being well earthed through a capacitive earth connection or conventional earth with preferably the distance between the two earth connections of

the transmitter and receiver plus the length of the coils in the transmitter and receiver forming a tuned length and the system thus composed being operated at a frequency that is an harmonic or close to an harmonic of the tuned length thus established. (In practice any length may be used, however efficiency may be impaired unless the tuned length is utilised.)

[0016] Preferably inverted Tesla coil or Magnifier has a large capacitance on an elevated terminal which becomes a high current, low-voltage node and is used as the neutral side during power transmission.

[0017] Preferably coils are caused to impress voltage through their high voltage terminal onto the ground through air separation or using any of the capacitive earthing devices mentioned in the text or shown in the drawings hereto or any other efficacious capacitive connection method.

[0018] Preferably the transmitting inverted Tesla Coil or Magnifier is brought into resonance with a second receiving Tesla Coil or Magnifier to maximize the amount of energy available in the receiving Tesla Coil or Magnifier.

[0019] Preferably additional Tesla Coils or Magnifiers are added for transmission and reception of power by having each of them being located in a triangular (or other) grid pattern so that the transmitters and receivers that are within range of each other all use the same frequency or a harmonic of each others frequency augmenting the action of the other transmitters and receivers.

[0020] Preferably longer distance transmission is achieved by using lower frequencies.

[0021] Preferably shorter distance transmission is achieved by using higher frequencies.

[0022] Preferably frequencies used for longer or shorter distances are an harmonic of one another.

[0023] In yet another broad form of the invention there is provided a system where the method of single conductor power transmission is used to develop AC current and subsequently transmit the power through the earth to a receiver so that the energy at the receiver is rendered useable.

[0024] In another broad form of the invention there is provided a system where an oscillating LCR or LC circuit of any description is used to develop AC current which is transmitted through the earth to a receiver using an LCR or LC circuit of any description as a single conductor power transfer system with which to transmit power wirelessly from one location to another using the earth as a single conductor to do so.

[0025] Preferably LCR or LC circuit of the transmitter and the LCR or LC circuit of the receiver is brought into resonance with each other.

[0026] Preferably more than one power transmission and reception system may operate contemporaneously with another power transmission and reception system and not interfere with one another as each system is built to operate at a different discrete frequency so that neither power transmission system interferes with the operation of the other allowing discrete power generation and transmission to occur to allow commercial competition.

[0027] Preferably power transmission on discrete frequencies is allocated to transmission and receiving power stations so that civilian power may run on one frequency and the defence forces may run on another frequency so that in the event that the civilian power grid goes down, the defence power grid still remains intact.

[0028] In yet another broad form of the invention there is provided, a wireless power transmission system comprising: a transmitter coil connected to the ground by its high voltage terminal using a capacitive earth connection and transmitting power through the ground to a subsequent receiving coil; the subsequent receiving coil being well earthed through a capacitive earth connection or conventional earth.

[0029] Preferably the distance between the earth connection of the transmitter coil and the earth connection of the receiving coil plus the length of the coils in the transmitter and receiver forming a tuned length and the system thus composed being operated at a frequency that is an harmonic or close to an harmonic of the tuned length thus established.

[0030] Preferably the transmitter coil has a large capacitance on an elevated terminal which becomes a high current low-voltage node and is used as the neutral side during power transmission.

[0031] Preferably the coils are caused to impress voltage through their high voltage terminal onto the ground.

[0032] Preferably the transmitting coil is brought into resonance with the receiving coil to maximize the amount of energy available in the receiving coil.

[0033] Preferably further including at least one additional coil for transmission and reception of power wherein the at least one additional coil is located in a triangular grid pattern so that the transmitter coil and receiver coil that are within range of each other all use the same frequency or a harmonic of each others frequency augmenting the action of the other transmitters and receivers.

[0034] Preferably longer distance transmission is achieved by using lower frequencies.

[0035] Preferably shorter distance transmission is achieved by using higher frequencies.

[0036] Preferably the frequencies used for longer distances are an harmonic of one another and of the shorter distance frequencies.

[0037] Preferably the frequencies used for shorter distances are an harmonic of one another and of the longer distance frequencies.

[0038] In yet another broad for of the invention there is provided a wireless power transmission system wherein single conductor power transmission is used to develop AC current and

subsequently transmit power through the earth to a receiver so that the energy at the receiver is rendered useable.

[0039] Preferably the oscillating LCR or LC circuit of the transmitter and the LCR or LC circuit of the receiver is brought into resonance with each other.

[0040] In a further broad form of the invention there is provided a wireless power transmission system wherein an oscillating LCR or LC circuit is used to develop AC current which is transmitted through the earth to a receiver using an LCR or LC circuit as a single conductor power transfer system with which to transmit power wirelessly from one location to another using the earth as a single conductor to do so.

[0041] Preferably further including at least one capacitive connection associated with an earth connection.

[0042] Preferably the oscillating LCR or LC circuit of the transmitter and the LCR or LC circuit of the receiver is brought into resonance with each other.

[0043] Preferably more than one power transmission and reception system may operate contemporaneously with another power transmission and reception system and not interfere with one another as each system is built to operate at a different discrete frequency so that neither power transmission system interferes with the operation of the other allowing discrete power generation and transmission to occur to allow commercial competition.

[0044] Preferably power transmission on discrete frequencies is allocated to transmission and receiving power stations so that civilian power may run on one frequency and the defence forces may run on another frequency so that in the event that the civilian power grid goes down, the defence power grid still remains in tact.

[0045] Preferably once the carrier wave is established in the earth between two points, the wave can then be overlaid with data signals using frequencies that are higher or lower harmonics of the

carrier frequency or other frequencies, whereby the system may be used for Data, signal, voice Transmission as well as power transmission.

[0046] In a preferred form of the system, once a carrier wave is established in the earth between two points, the wave is then overlaid or varied to induce data signals for transmission thereover.

[0047] Preferably the wave is overlaid using any method of Frequency Modulation, Frequency Shift Keying, Encoding or any other technology currently extant whereby the system may be used for Data, signal, voice Transmission as well as power transmission.

[0048] Preferably the carrier wave is established in the earth between points then the frequency may be varied using a pre-programmed input.

[0049] Preferably the pre-programmed input frequently shifts the frequency of transmission thereby making it very difficult to tune into the system with a receiver, unless one has access to the pre-programmed transmission frequency input sequence so that the next frequency shift can be anticipated and tuned synchronously with the tuning shift in the transmitter.

[0050] In yet another broad form of the invention there is provided a method of forming a tuned network from at least one first coil assembly and an at least one second coil assembly; the method comprising: connecting a capacitor between the at least one first coil assembly and earth, and the at least one second coil assembly and earth, such that a tuned path is formed through the earth between the at least one first coil assembly and the at least one second coil assembly, when at least one of the at least one first coil assembly or second coil assembly is excited at a predetermined frequency.

[0051] Preferably the capacitor is formed from a first metal plate and at least a second metal plate.

[0052] Preferably the first metal plate is formed as a substantially closed volume.

[0053] Preferably the substantially closed volume is a sphere.

[0054] Preferably the first metal plate is substantially enclosed by the second metal plate.

[0055] Preferably the second plate is located within the earth.

[0056] Preferably the first plate is located at or near an earth/air interface.

[0057] In yet another broad form of the invention there is provided a method of earthing oscillating coils through a capacitive connection to the earth so that AC earth electrical currents will be developed when the capacitive connection is excited with AC electrical energy.

[0058] Preferably a plurality of oscillating coils is used as transmitters, then electrical currents flow between the connections facilitating wireless power transmission through the ground.

[0059] In a further broad form of the invention there is provided a method of maximizing potential between a first coil connected capacitively to a first earth terminal and a second coil connected capacitively to a second earth terminal; the first earth terminal spaced from the second earth terminal; the method including the step of: exciting at least the first coil at a predetermined frequency which maximizes the voltage difference between at least a portion of the first coil and at least a portion of the second coil.

[0060] Preferably once a carrier wave is established in the earth between two points, the wave is then overlaid with data signals using frequencies that are higher or lower harmonics of the carrier frequency (or other frequencies) whereby the system may be used for Data, signal, voice Transmission as well as power transmission.

[0061] Preferably the carrier wave is established in the earth between two points, the wave is then overlaid or varied to induce data signals for transmission thereover.

[0062] Preferably the wave is overlaid using any method of Frequency Modulation, Frequency Shift Keying, Encoding or any other technology currently extant whereby the system may be used for Data, signal, voice Transmission as well as power transmission.

[0063] Preferably the carrier wave is established in the earth between points then the frequency may be varied using a pre-programmed input.

[0064] Preferably the pre-programmed input frequently shifts the frequency of transmission thereby making it very difficult to tune into the system with a receiver, unless one has access to the pre-programmed transmission frequency input sequence so that the next frequency shift can be anticipated and tuned synchronously with the tuning shift in the transmitter.

[0065] This process secures the system from having energy stolen from the transmission by electricity thieves.

BRIEF DESCRIPTION OF DRAWINGS

[0066] Embodiments of the present invention will now be described with reference to the accompanying drawings wherein:

[0067] Fig 1a illustrates a typical earthing system as referred to in this document;

[0068] Fig 1b illustrates a variable capacitor to allow earthing as described in this document;

[0069] Fig 1c shows another method of connecting an oscillating coil to the earth capacitively;

[0070] Fig 2 illustrates a Tesla Magnifier impressing voltage pressure to the earth through the apparatus in Fig 1a;

[0071] Fig 3 illustrates a half wave AC solenoid coil applying voltage pressure to the earth using the capacitive earth connection in Fig 1b;

[0072] Fig 4 is a resonantly coupled transmitter pair connected to the earth using capacitive earth connections. Two Tesla coils, one conductively connected to earth and one connected to the earth using capacitance are shown in between the two transmitters utilizing currents established in the ground between the two transmitters.

DESCRIPTION OF EMBODIMENTS

[0073] This specification builds on the inventor's earlier filed Australian provisional patent application no 2012900054 filed 6 January 2012 the disclosure of which including description, claims and drawings is incorporated herein by cross reference.

[0074] The preferred embodiment provides a means to connect to the earth with oscillating coils so that power transfer may take place between the earth and the power transmitter. An oscillating coil being a Tesla coil or magnifier or any other coil is set in motion using a generator or a DC pulse width driver or any other apparatus which causes the coil to gain frequency and also voltage. The highest voltage end is connected to a sphere or other suitable shaped object such as an ellipsoid which is placed inside a cavity which has been created in the ground and lined with conductive material with a good earth established with this lining. Both sides of the capacitor thus constructed should be made of an electrically conductive material. The cavity may be constructed deeper in the earth and connected to the top through a cylindrical hole lined with either conductive material or an insulator, depending on how much capacitance is required and the voltages used. The cavity's conductive lining may be connected to earthing radials made of suitably conductive material to increase the conductivity between the cavity lining and the earth.

[0075] The apparatus thus described is one method only in connecting in this manner. The device is designed to provide a capacitive connection to the earth of a high voltage oscillating source using the capacitance to offset the impedance in the earth. The object of the design is to simply connect the sphere connected to the coil operating the high voltage end of the Tesla coil or other coil to the earth using capacitance so that the impedance of the earth is matched to allow currents to be established in the earth from the high voltage portion of the oscillating circuit. The currents created by a capacitor of this design tend to promote closer in phase voltage and current in the near field of the capacitive connection.

[0076] It has been well established that there is small ground impedance for frequencies up to around 20 kHz and it can then increase with increased frequency. The design of the capacitor thus established is then sized to operate at the required frequency of operation so that the capacitive reactance offsets the ground impedance for the required frequency. For example if we build a capacitor that is buried with the outside sphere of the capacitor connected to the earth and on the inside we place another sphere creating an air gap between the two spheres and it has a capacitance of say 159nF then the capacitive reactance at that frequency is 1 / 2 x pi x C x F and we wish to operate it at 20 kHz the capacitive reactance is just over 50 Ohms. If the earthing impedance when tested at this point is also 50 Ohms then we have an almost exact match so that the capacitive connection offsets the impedance in the earth allowing current to flow from the earth connected side of the capacitor more efficiently. If the earth impedance once tested at a particular location is known then the capacitor should be sized using the frequency required to offset the impedance of the earth at that frequency. The capacitance requirement of the coil connected to this capacitor must also be taken into account in the usual manner.

[0077] The connection is used to facilitate better ground based power transfer through the earth using oscillating currents induced in the earth using high voltage.

[0078] The cavity in the ground can be any shape with volume as can the inner side of the capacitor and may also be a sheet of conductive material on the surface of the ground which is well grounded. There will be less breakout occurring between the two sides of the capacitor if they are both symmetrical with smooth curved surfaces.

[0079] The capacitive connection thus established between the earth and the coil will allow much more efficient transfer of energy from the coil to the earth. The better the earthing of the earth side of the capacitor to the earth then the greater the amount of power transfer may be conducted with fewer losses.

[0080] Two transmitters each independently electrically powered by a local source are then set up using this capacitive connection to the earth at a distance from one another so that the straight line distance between the transmitters is preferably an odd multiple of a half wavelength of the frequency being used to transmit. This means that when one polarity of the voltage impressed into the earth by one transmitter is positive, the voltage in the other transmitter is negative and vice

versa. In this way currents are forced through the ground backwards and forwards between the high and low voltage points establishing an AC current in the ground between the two transmitters. Both transmitters are brought into resonance and power may be taken from any point in between the two transmitters by a conventionally earthed Tesla coil or other suitable resonator known to those skilled in the art. An even multiple of a half wavelength distance may also be used between transmitters which would mean both transmitters impress voltage onto the ground in the same sense at the same time. Any other distance which enhances the transmission of power, with each subsequent transmitter being tuned to be synchronous with the AC signal in the ground being transmitted by the first transmitter may also be used, such as a distance of a three quarter wave with the second transmitter suitably out of phase with the first transmitter etc. Transmission may take place also when just using a single transmitter and in this case the transmission will be more omnidirectional. Many transmitters may be used at once and when this is the case care should be taken to ensure that the location of each transmitter is compatible with transmitters within range of each other to ensure their activity is such that they each augment the others electrical activity rather than retarding it.

[0081] Referring to Fig 1a is a sketch of one method of designing a capacitive connection to the earth of an AC coil. A is a coil coming from an oscillating electrical circuit which is connected to B which is a sphere made of conductive material. C is another sphere which is buried in the ground and connected conductively to the earth E with a cylindrical top extending to the surface of the earth D. F is a former onto which coil A is wound and G is a dielectric insulator which may be used to insulate C from connection to the earth if this is considered appropriate. A further metal skin may also be added to the outside of G for connection directly to earth. C may be connected to earthing radials J which may be many or few and extend from C in the same fashion as spokes extend from the centre of a wheel. H is a method of reducing breakout between the two sides of the capacitor since the rounded form will impede this activity. I is a polished metal cylinder that may be designed in length so that the coil can be raised out of the earth if the voltage is too high so that only the polished metal surface acts against the earthed side of the capacitor. This will allow more voltage to be used by the sphere before breakout occurs.

[0082] When sphere B is brought to a high voltage in a positive sense it propels electrons from the embedded sphere C into the earth. On the return cycle when B becomes negative then the electrons are then attracted to C. Thus an alternating field is set up in the earth in the vicinity of this high voltage oscillation.

[0083] The impedance of the connection of the capacitor may be designed in such a way to offset and inductance in coil A and provide the correct capacitive reaction to offset the ground impedance (if any) encountered in causing electric currents to arise in the earth. The setup may be placed further into the earth simply by extending the connecting cylinder at the top of sphere C and the metal cylinder I. I may be slotted to reduced currents forming in the cylinder in the vicinity of its join to the coil A.

[0084] Referring to Fig 1b is a capacitor that may be varied in capacitance by inserting the centre portion of the capacitor K (a cylinder with spherical end caps) into the ground by lowering it into a hole lined with a cylinder H made of conductive material. Cylinder H may also have the curved surface at the top as shown in Fig 1a-H. The capacitor is connected to coil I and coil former J which is raised and lowered by a lifting device which is not shown. The further into the cylinder H cylinder K is inserted then the more capacitance is achieved. Guides L are insulation formers which guide the centre cylinder K to ensure the distance between the two cylinders remains constant.

[0085] When high AC voltage is generated in cylinder K then an AC energy disturbance appears in the earth surrounding cylinder H. Insulator M may be inserted in the top of the cylinder H to avoid flashover from coil I. For larger voltages the size of the hole and the insulator may be increased. Insulator M may be contrived so that it extends to further cover the coil.

[0086] Referring to Fig 1c illustrates another earthing method where a flat plate I or rounded surface plate J may be used to connect sphere C which is operated by AC from coil A wound on coil former B. Rod D connects the plate I or J to the ground E through high surface area grounding plate K. Electrical currents are produced in the earth due to the capacitive connection between sphere C and plates I or J when AC voltage is used in sphere C.

[0087] Referring to Fig 2 shows a Tesla Magnifier designed in such a way so that the top capacitor toroid A is the low voltage side of the coil set up and the high voltage side capacitor is B. This is inverted compared to a normal Tesla Magnifier as this one has the primary coil C at the top and secondary coil D also at the top. Tertiary coil E extends into the secondary coil D slightly but is still allowed to resonate either freely or at a forced higher harmonic if its actual tuning is lower than the

operational frequency of the apparatus which can be achieved using a higher K connection to secondary coil C. F is a polished metal cylinder which joins coil E to capacitor B and has a slotted covering connection to the coil at G to stop breakout. The interaction between cylinder F and sphere B collectively with grounded cylinder (with spherical end) H is capacitive. When F and B are brought to high voltage then a field in the opposite sense may be set up in cylinder H suppressing breakout from cylinder F of sphere B to H. If very high voltages are to be used then radials J may be disconnected from H and an insulator may be placed between H and the earth L to enhance the voltage polarity reversal between H and B (as shown in Fig 1a at G). Radials J may be used to enhance the earthing of cylinder H. I is a support beam constructed from a suitable material to act as an insulator to keep toroid A electrically insulated from the ground and with which to support toroid A at the lower voltage point on the toroid which is a metal plate K which is also connected to the end of the secondary coil D. Capacitor M is used to tune the secondary coil C to run at the same frequency as the resonating coil E. Capacitor N may be used as a shunt on the primary coil C if considered necessary. Generator P is kept separate from the ground and not earthed to the ground L, but may be earthed to metal plate K along with the secondary and primary coils D and C. Just treat the toroid capacitor as if it was the earth in your connections. The relationship between the voltage in toroid capacitor A and sphere capacitor B is as normal such that C1V1 = C2V2. Thus the high capacitance runs at low voltage and the low capacitance runs a high voltage.

[0088] In operation the large toroid capacitor may be sized in such a way that it is a sub-harmonic of the operating frequency and then forced through a high K connection between coils D and C to run at a higher operating frequency. This means the toroid has swamped the coil system at this end and makes it capacitive and therefore a current node. It effectively makes an earth in the air. The high voltage node then appears at the other end of the coil system in capacitor sphere B. During operation capacitor B is excited with high voltage AC electricity which induces currents into the earth L surrounding the earth connection H and J. The higher the voltage attained in B then the further the effect of the currents in the earth may be detected.

[0089] To characterize the transmission system in normal terms: we have the earth replaced by the toroid at the top of the structure which now becomes the neutral side of the AC circuit. The active side of the circuit is now the earth or ground and since we now have an active and a neutral; current flows from one capacitive connection of the active high voltage transmitter to the other transmitter connected by capacitance to the active with its own separate neutral (toroid). Compared to SWER

transmission systems in which the power line is the active with the earth the neutral, we now have the exact opposite. The earth neutral is replaced by the toroid on both transmitters. The active is now the ground itself. The receiver may connect to the earth either by capacitance or through a direct connection in the normal manner.

[0090] If the sum of the lengths of the secondary and tertiary coils is a full wave length of the operating frequency then capacitor side H will be the same polarity as toroid A which may enhance the distance the electrical energy is transmitted through the ground.

[0091] If the large capacitive surface A was a sphere instead of a toroid and it is of sufficient size, a horizontal platform may be constructed inside the sphere made of insulating material and a spiral coil design used so that the primary and secondary coil would operate in this space. The outside loops of the primary and secondary coils would then each earth to the sphere. The tertiary coil may then be attached to the high voltage end of the secondary coil and extend through a suitably shaped hole in the bottom of the sphere ensuring at all times that there is sufficient distance between the high voltage end of the tertiary coil and the sphere to avoid electrical breakout. In this case cylinder F may be extended in length to join to the end of the tertiary coil E in the normal manner. The shape of the sphere may be the same as used on the Tesla Magnifier built at Wardenclyffe, or any other design which would suit the purpose.

[0092] Referring to Fig 3 shows two quarter wave coils A operated by secondary coil B and joined to each end of capacitor C. The coils are energized by primary coil D in the usual way which is operated by a primary coil in the usual way. E is a sphere used as a capacitor and F is an ellipsoid used in the fashion as described in fig 1b. Using AC power input the coils are brought to high voltage through resonance. In this set up the capacitors at E and F should be tuned to allow maximum voltage activity to appear in coils A in the usual way. The ellipsoid F is inserted into grounding half ellipsoid structure G to vary the capacitance and provide capacitive connection to the earth H. The earth connection H is impressed with high voltage which sets up oscillating AC currents in the earth.

[0093] Referring to Fig 4 shows two transmitters A and B based on the design of the transmitter in Fig 2 connected to the ground using the capacitive connection method described in Fig 1a. Ideally, the distance separating the two transmitters is D which is an odd multiple of a half wavelength of

the frequency being used. This means that when transmitter A is showing a positive charge in the earth then B is showing a negative charge in the earth. This induces currents to flow between the earths of both transmitters. Two power receiving Tesla coils or resonators C and E with power take off circuits are connected to the ground in between the two transmitter coils, one conductively in the traditional manner and the other using capacitance as per the design in Fig 1a. When both transmitters A and B are operated so that they operate synchronously in resonance with one another then currents will flow though the earth between the two capacitive earth connections enabling power to be taken from the earth with Tesla coils C or E. Power may also be able to be taken from either transmitter omni-directionally independently in smaller amounts, but the main electrical activity in the ground will occur between the two transmitters. It is obvious that more than two transmitters and receivers may be used as long as they are in a resonantly harmonious relationship to each other in regards to their separation distance from one another and frequency at which they operate. If a transmitter if very high power were to be constructed in this manner then power would be available omnidirectionally with significant power available in any direction.

[0094] When the transmitter is operated at low frequency say around or below 20 kHz then large departures can be made from the ideal separation distance between the two transmitters due to the long wavelength which is 15 km. It is best however to determine the two locations for the transmitters and design them around a convenient frequency of the intervening distance for maximum performance.

[0095] Further variations within the scope of the invention contemplated. For example:

[0096] In one form the carrier wave is established in the earth between two points and the wave is then overlaid or varied to induce data signals for transmission thereover.

[0097] Preferably the wave is overlaid using any method of Frequency Modulation, Frequency Shift Keying, Encoding or any other technology currently extant whereby the system may be used for Data, signal, voice Transmission as well as power transmission.

[0098] Preferably the carrier wave is established in the earth between points then the frequency may be varied using a pre-programmed input.

[0099] Preferably the pre-programmed input frequently shifts the frequency of transmission thereby making it very difficult to tune into the system with a receiver, unless one has access to the pre-programmed transmission frequency input sequence so that the next frequency shift can be anticipated and tuned synchronously with the tuning shift in the transmitter.

[0100] This process secures the system from having energy stolen from the transmission by electricity thieves.

[0101] Reference throughout this specification to "one embodiment" or "an embodiment" means that a particular feature, structure or characteristic described in connection with the embodiment is included in at least one embodiment of the present invention. Thus, appearances of the phrases "in one embodiment" or "in an embodiment" in various places throughout this specification are not necessarily all referring to the same embodiment, but may. Furthermore, the particular features, structures or characteristics may be combined in any suitable manner, as would be apparent to one of ordinary skill in the art from this disclosure, in one or more embodiments.

[0102] Similarly it should be appreciated that in the above description of exemplary embodiments of the invention, various features of the invention are sometimes grouped together in a single embodiment, Fig., or description thereof for the purpose of streamlining the disclosure and aiding in the understanding of one or more of the various inventive aspects. This method of disclosure, however, is not to be interpreted as reflecting an intention that the claimed invention requires more features than are expressly recited in each claim. Rather, as the following claims reflect, inventive aspects lie in less than all features of a single foregoing disclosed embodiment. Thus, the claims following the Detailed Description are hereby expressly incorporated into this Detailed Description, with each claim standing on its own as a separate embodiment of this invention.

[0103] Furthermore, while some embodiments described herein include some but not other features included in other embodiments, combinations of features of different embodiments are meant to be within the scope of the invention, and form different embodiments, as would be understood by those in the art. For example, in the following claims, any of the claimed embodiments can be used in any combination.

[0104] In the description provided herein, numerous specific details are set forth. However, it is understood that embodiments of the invention may be practiced without these specific details. In other instances, well-known methods, structures and techniques have not been shown in detail in order not to obscure an understanding of this description.

[0105] As used herein, unless otherwise specified the use of the ordinal adjectives "first", "second", "third", etc., to describe a common object, merely indicate that different instances of like objects are being referred to, and are not intended to imply that the objects so described must be in a given sequence, either temporally, spatially, in ranking, or in any other manner.

[0106] Capacitive earth connection means any connection to earth using any of the two sided capacitors sketched in the drawing attached or any apparatus that uses similar principles of connection to gain a connection through capacitance to the ground. A capacitive earth connection therefore doesn't imply that the high voltage part of the capacitor comes into direct contact with the earth.

[0107] Operating frequency means the frequency at which the apparatus is designed to be operated.

[0108] Inverted Tesla coil or Magnifier means any Tesla Coil or Magnifier using the principle of putting a high voltage sphere or terminal close to the ground to induce current in the ground.

[0109] Tesla coil or Magnifier means Tesla coil or Magnifier and may also mean inverted Tesla Coil or Magnifier if the sense of the description demands it.

[0110] In the claims below and the description herein, any one of the terms comprising, comprised of or which comprises is an open term that means including at least the elements/features that follow, but not excluding others. Thus, the term comprising, when used in the claims, should not be interpreted as being limitative to the means or elements or steps listed thereafter. For example, the scope of the expression a device comprising A and B should not be limited to devices consisting only of elements A and B. Any one of the terms including or which includes or that includes as

used herein is also an open term that also means including at least the elements/features that follow the term, but not excluding others. Thus, including is synonymous with and means comprising.

[0111] Similarly, it is to be noticed that the term coupled, when used in the claims, should not be interpreted as being limitative to direct connections only. The terms "coupled" and "connected," along with their derivatives, may be used. It should be understood that these terms are not intended as synonyms for each other. Thus, the scope of the expression a device A coupled to a device B should not be limited to devices or systems wherein an output of device A is directly connected to an input of device B. It means that there exists a path between an output of A and an input of B which may be a path including other devices or means. "Coupled" may mean that two or more elements are either in direct physical or electrical contact, or that two or more elements are not in direct contact with each other but yet still co-operate or interact with each other.

[0112] Although the present invention has been described with particular reference to certain preferred embodiments thereof, variations and modifications of the present invention can be effected within the spirit and scope of the following claims.

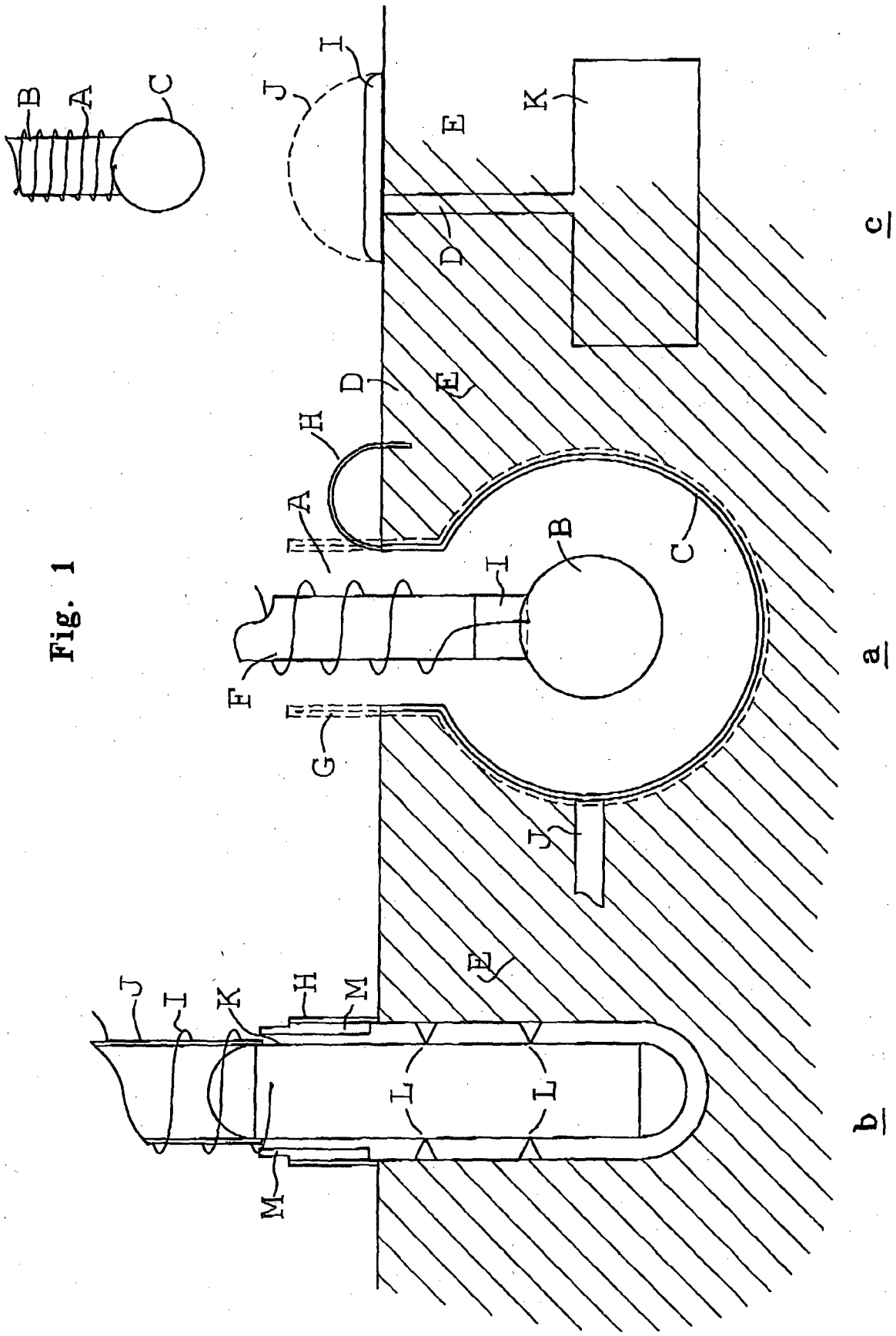

Fig. 1

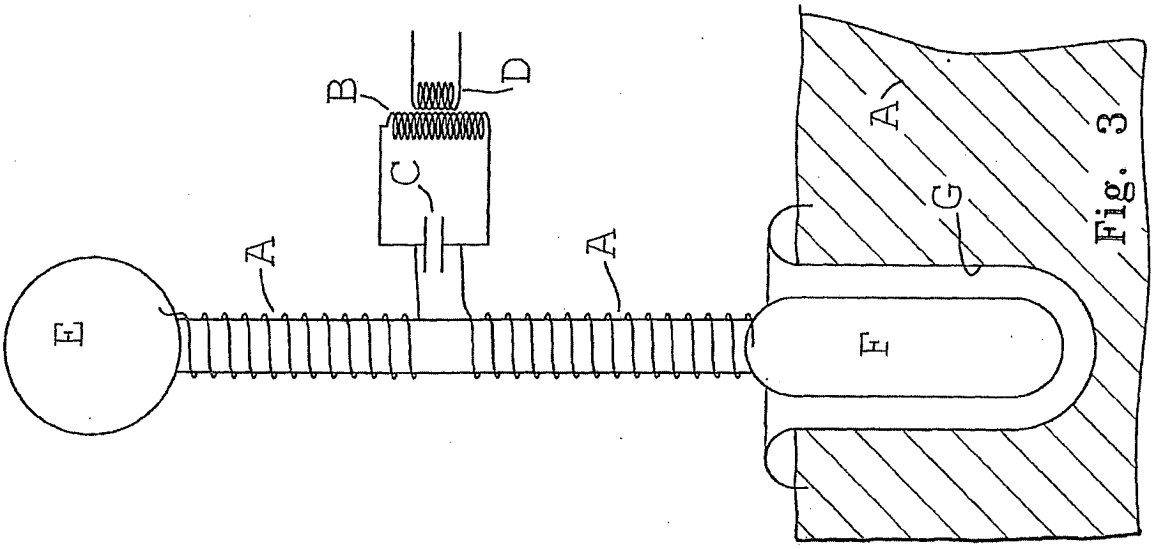

Fig. 3

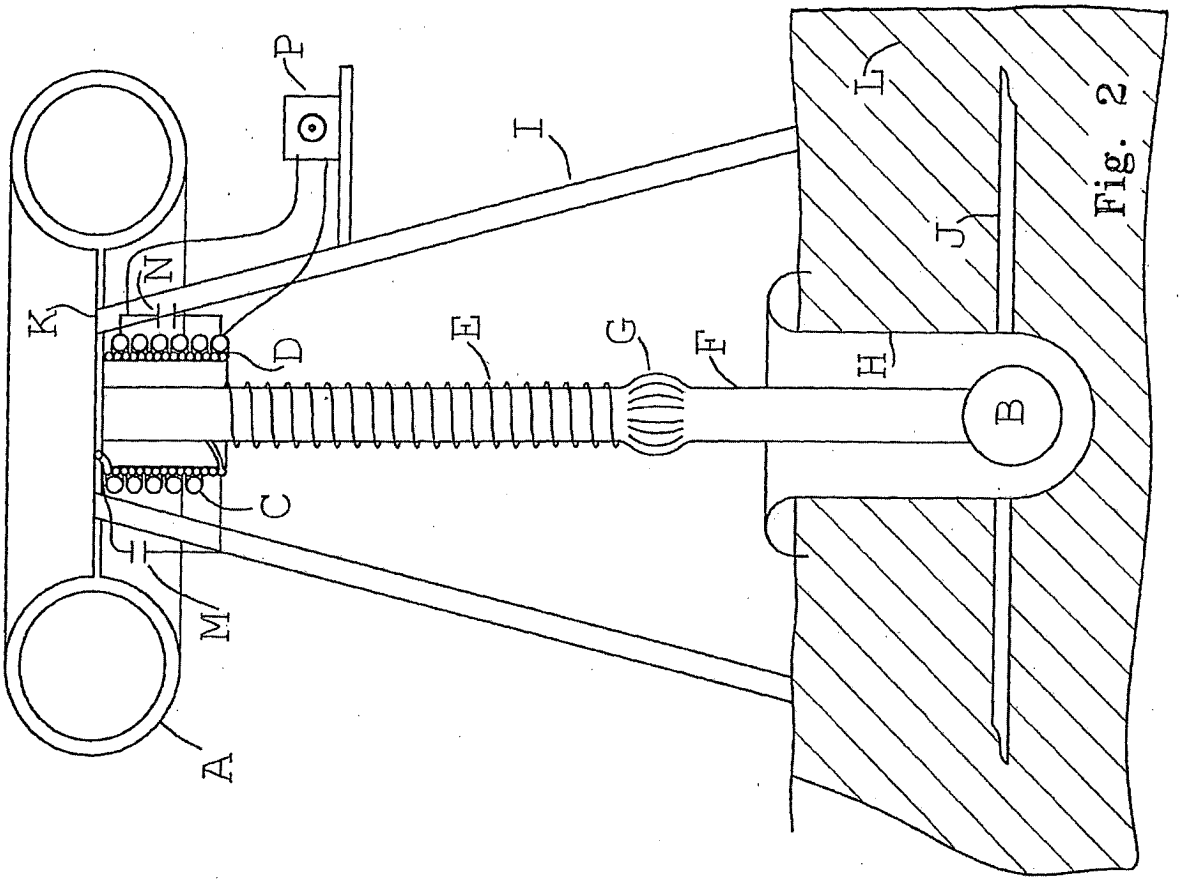

Fig. 2

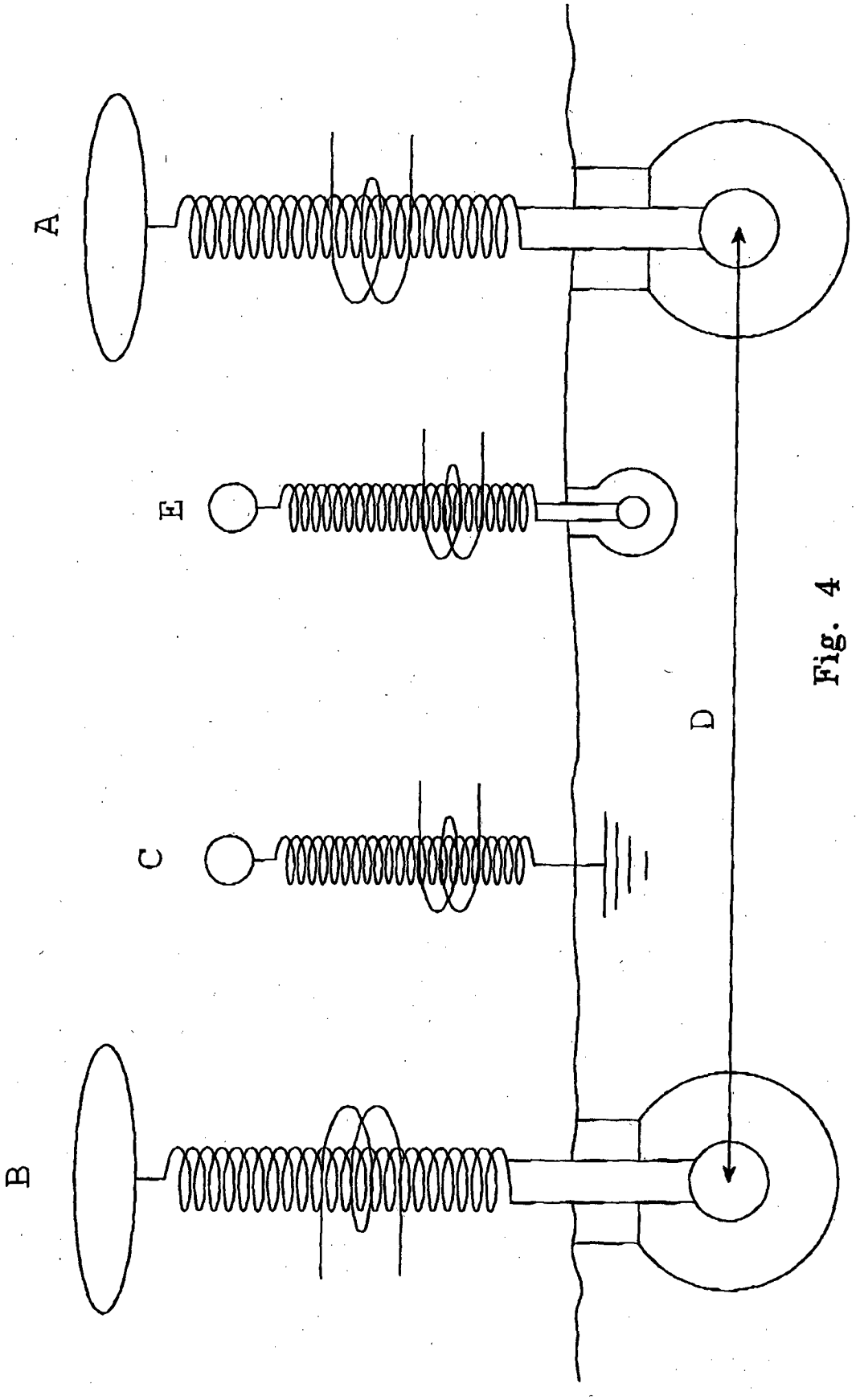

Fig. 4

CA 02867602 2014-09-17

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference 125015	**FOR FURTHER ACTION**	See item 4 below
International application No. PCT/AU2013/000002	International filing date *(day/month/year)* 03 January 2013 (03.01.2013)	Priority date *(day/month/year)* 19 March 2012 (19.03.2012)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant HOWARD, Keith Maxwell		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 9 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☒	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☒	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☒	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis* .2).

	Date of issuance of this report 23 September 2014 (23.09.2014)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer Athina Nickitas-Etienne e-mail: pt04.pct@wipo.int

PATENT COOPERATION TREATY

From the:
INTERNATIONAL SEARCHING AUTHORITY

To:

WALLINGTON-DUMMER
GPO Box 3888
Sydney, NSW 2001
Australia

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing *(day/month/year)*
21 March 2013

Applicant's or agent's file reference	**FOR FURTHER ACTION**
125015	See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/AU2013/000002	03 January 2013	06 January 2012

International Patent Classification (IPC) or both national classification and IPC
H02J 17/00 (2006.01) H01F 27/00 (2006.01)

Applicant
HOWARD, Keith Maxwell

1. This opinion contains indications relating to the following items:

- [X] Box No. I — Basis of the opinion
- [ ] Box No. II — Priority
- [X] Box No. III — Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [X] Box No. IV — Lack of unity of invention
- [X] Box No. V — Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- [ ] Box No. VI — Certain documents cited
- [X] Box No. VII — Certain defects in the international application
- [ ] Box No. VIII — Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA	Date of completion of this opinion	**Authorised Officer**
AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA Email address: pct@ipaustralia.gov.au Facsimile No. +61 2 6283 7999	21 March 2013	Shuchin Taher AUSTRALIAN PATENT OFFICE (ISO 9001 Quality Certified Service) Telephone No. 0262832862

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/AU2013/000002

Box No. I Basis of this opinion

1. With regard to the **language,** this opinion has been established on the basis of:

   [X] The international application in the language in which it was filed

   [ ] A translation of the international application into, , which is the language of a translation furnished for the purposes of international search (under Rules 12.3(a) and 23.1(b)).

2. [ ] This opinion has been established taking into account **the rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing filed or furnished:

   a. (means)

      [ ] on paper

      [ ] in electronic form

   b. (time)

      [ ] in the international application as filed

      [ ] together with the international application in electronic form

      [ ] subsequently to this Authority for the purposes of search

4. [ ] In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/AU2013/000002

Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non obvious), or to be industrially applicable have not been examined in respect of:

☐ the entire international application

☒ claims Nos: **51**

because:

☐ the said international application, or the said claim Nos.

relate to the following subject matter which does not require an international search *(specify)*:

☐ the description, claims or drawings *(indicate particular elements below)* or said claims Nos.

are so unclear that no meaningful opinion could be formed *(specify)*:

☐ the claims, or said claims Nos.

are so inadequately supported by the description that no meaningful opinion could be formed *(specify)*:

☒ no international search report has been established for said claims Nos. **51**

☐ a meaningful opinion could not be formed without the sequence listing; the applicant did not, within the prescribed time limit:

☐ furnish a sequence listing on paper complying with the standard provided for in Annex C of the Administrative Instructions, and such listing was not available to the International Searching Authority in a form and manner acceptable to it.

☐ furnish a sequence listing in electronic form complying with the standard provided for in Annex C of the Administrative Instructions, and such listing was not available to the International Searching Authority in a form and manner acceptable to it.

☐ pay the required late furnishing fee for the furnishing of a sequence listing in response to an invitation under Rule 13*ter*.1(a) or (b).

☐ See Supplemental Box for further details.

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/AU2013/000002

Box No. IV Lack of unity of invention

1. [X] In response to the invitation (Form PCT/ISA/206) to pay additional fees the applicant has, within the applicable time limit:

   [ ] paid additional fees

   [ ] paid additional fees under protest and, where applicable, the protest fee

   [ ] paid additional fees under protest but the applicable protest fee was not paid

   [X] not paid additional fees

2. [ ] This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rule 13.1, 13.2 and 13.3 is

   [ ] complied with

   [X] not complied with for the following reasons:

See Supplemental Box for Details

4. Consequently, this opinion has been established in respect of the following parts of the international application:

   [ ] all parts

   [X] the parts relating to claims Nos. **1-8, 14-23, 32-38 and in part claims 12-13, 29-31, 47-50.**

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY	International Application No. PCT/AU2013/000002

Box No. V **Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims **34-36**	**YES**
	Claims **1-8, 12-23, 29-33, 37-38, 47-50**	**NO**
Inventive step (IS)	Claims **NONE**	**YES**
	Claims **1-8, 12-23, 29-38, 47-50**	**NO**
Industrial applicability (IA)	Claims **1-8, 12-23, 29-38, 47-50**	**YES**
	Claims **NONE**	**NO**

2. CITATIONS AND EXPLANATIONS:

CITATIONS

D1: US 2011/0156494 A1 (MASHINSKY) 30 June 2011

NOVELTY (N)

The invention defined in claims 1-8, 12-23, 29-33, 37-38, 47-50 is not novel in light of D1.

As per claim 1, D1 discloses a wireless power transmission system (para. 0014) comprising: a transmitting inverted Tesla Coil or Magnifier (para. 0029) connected to the ground by its high voltage terminal (para. 0027) using a capacitive earth connection (para. 0027 and 0040-0041, claim 1, '*...a ground plate and a first coil **elevated** above the ground plate and comprising a first-direction winding to define with said ground plate a capacitance...*') and transmitting power through the ground to a subsequent receiving Tesia Coil or Magnifier being well earthed through a capacitive earth connection or conventional earth (para. 0026) with the distance between the two earth connections of the transmitter and receiver plus the length of the coils in the transmitter and receiver forming a tuned length and the system thus composed being operated at a frequency that is an harmonic or close to an harmonic of the tuned length thus established (para. 0028, '*...the system utilizes a phenomenon which can create a low energy **standing electromagnetic wave** that oscillates on a permanent basis at an exact frequency and wavelength...Such a standing wave needs to be **tuned**, such that as the wave bounces back and forth between the point of origin and an anti-node...the **resonance** is synchronized with the body...*', "setting the operating frequency at a harmonic of the total travelling distance, i.e. the tuned length would be a requirement for producing **resonance** between the transmitter and receiver, which is necessary for producing a standing electromagnetic wave, as disclosed in para. 0028").

A similar resoning as per claim 1 is applied to the invention defined in claims 2, 4, 14-16, 18 and 32 (As per the feature of the elevated terminal being used as "the neutral side during power transmission", this feature is required for the disclosure of para. 0027 in order to use the earth/ground as the active side of the circuit as disclosed in the following passage, '*...an electrical charge is moved in rapid charge and discharge motions between the capacitor and the surface of the Earth*'; As per claims 4 and 18, the feature of maximizing the amount of energy available in the receiver is disclosed in para. 0036, '*the receiving tower is built at a point at which the quarter wave will peak such that a maximum level of energy is absorbed by the receiver*').

The additional features defined in claims 3, 5-8, 12-13, 17, 19-23, 29-31, 33, 37-38, 47-50 are also disclosed in D1 in the following passages listed against each group of claims:

Claims 3 and 17: para. 0027 and claim 7, '*applying a **high voltage** to a set of coils at the transmitter node 10, an electrical charge is moved in rapid charge and discharge motions between the **capacitor** and the **surface of the Earth***'; '*transmitter node is further operable for **impressing** a signal on said induced oscillating electric wave*'.

Claims 5 and 19: para. 0038 and 0041, '*...to create and maintain a standing wave which can be tuned and "tapped" by a receiver having a coil or set of plates and receivers that are tuned to resonate and oscillate at the same **frequency** or one of its **harmonics***'; '***transmitting towers** are placed **adjacent** to generating facilities and **receiving towers** are widely dispersed around the planet such that service is provided to a local area via a local power **grid***', "the passages imply multiple **additional** transmitting and receiving coils adjacent to each other operating at the appropriate frequency or a harmonic of the frequency necessary to effect a standing wave".

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International Application No.

PCT/AU2013/000002

Claims 6-8 and 20-23: para. 0038 and para. 0036, '*maintain a **standing wave**...tuned to resonate and oscillate at the same **frequency** or one of its **harmonics***'; '*the receiving tower is built at a point at which the quarter wave will peak such that a maximum level of energy is absorbed by the receiver*'; "it is inherent that using lower and higher frequencies would respectively result in longer and shorter distance transmission (while maintaining the standing wave) being achieved, because they produce longer and shorter wavelengths respectively; furthermore, the frequencies appropriate for both longer and shorter distances are inherently harmonic of each other because all **lower frequencies** have their harmonics at **higher fequencies** (Definition of 'harmonic': '*a harmonic of a wave is a component frequency of the signal that is an integer multiple of the fundamental frequency, i.e. if the fundamental frequency is **f**, the harmonics have frequencies **2f, 3f, 4f,** . . . etc.*')".

Claims 12-13 and 29-30: para. 0035, '*measuring each **interference**...the computer system can send or receive **specific** information corresponding to a **specific** channel of communications...the receiver or receivers are **required** to resonate at the natural **frequency** of the transmitter or transmitters to establish data or power transmission*'; "it is inherent from the disclosure of the passage that individual i.e. discrete frequencies may be used between a transmitter-receiver pair in order to avoid interference from other pairs or sources; as such, it is considered that the system disclosed in this passage is *capable of use* in the areas or setups described in claims 13 and 30".

Claim 31, 47-48: para. 0026 and 0015, '*system for transmitting power, voice and data without wires...*'; '*Such frequencies (pulse modulated) are **overlaid** on top of power transmission or a signal which may **exist** between two or more resonant transceiver*'; '*...can be inserted or extracted via ...known methods of frequency or optical modulation*'; "overlaying a '*wave*' with '*data signals using frequencies that are higher or lower harmonics of the carrier frequency*' contitutes data transmission via frequency modulation (FM) which is disclosed in para. 0015".

Claim 33: para. 0038 and 0040, '*set of plates*'.

Claim 37-38: para. 0040, '*a large metal plate 50 that is placed at depth in the ground*'; "it is understood from this passage that the second plate (analogous to the *first plate* mentioned in claim 38) of the *set of plates* mentioned in para. 0038 will also be placed at or near the earth (in order to function as a capacitor, the plates must be close to each other)".

Claim 49-50: para. 0045, '*The receiver can be programmed to automatically respond to the **received signal (information)** by creating interference or absorbing the generated power wave*'; "it is understood from para. 0035 that this is done by varying the frequency".

Therefore the subject matter of claims 1-8, 12-23, 29-33, 37-38, 47-50 is not new and does not meet the requirements of Article 33(2) of the PCT with regard to novelty.

Claims 34-36 meet the criteria set forth in PCT Article 33(2) for novelty because none of the prior art documents published before the priority date individually disclose the specific combination of features defined in these claims.

INVENTIVE STEP (IS)

Claims 1-8, 12-23, 29-33, 37-38, 47-50 are not novel and hence do not involve an inventive step.

The invention defined in claims 34-36 does not involve an inventive step in light of D1.

Metal plate capacitors formed as a substantially closed volume, in particular, where the plates are spherically shaped and where the interior plate is enclosed by the exterior plate, are well known in the art. Hence, such a setup constitutes merely a matter of design choice, which cannot contribute to providing a patentable inventive step. As such, the invention defined in claims 34-36 is considered to lack an inventive step.

Therefore the subject matter of all of claims 1-8, 12-23, 29-38, 47-50 is obvious and does not meet the requirements of Article 33(3) of the PCT with regard to inventive step.

INDUSTRIAL APPLICABILITY (IA)

The invention defined in claims 1-8, 12-23, 29-38, 47-50 is considered to meet the requirements of Industrial Applicability under Article 33(4) of the PCT because it can be made by, or used in, industry.

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY	International Application No.
Box No. VII Certain defects in the international application	**PCT/AU2013/000002**

The following defects in the form or contents of the international application have been noted:

Claim 51 does not comply with Rule 6.2(a) because it relies on references to the description and/or drawings. Therefore no search has been established for claim 51.

Claim 3 was examined with the assumption that the scope of the claim is limited to only those options defined in the claim, that do not rely on references to the description and/or drawings, i.e. '*air separation*' and '*any other efficacious capacitive connection method*'.

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY	International Application No.
Supplemental Box	**PCT/AU2013/000002**

Continuation of: **Box IV**

This International Application does not comply with the requirements of unity of invention because it does not relate to one invention or to a group of inventions so linked as to form a single general inventive concept.

This Authority has found that there are different inventions based on the following features that separate the claims into distinct groups:

• Claims 1-8, 14-23 and in part claims 12-13, 29-31, 47-50 are directed to a wireless power transmission system. The feature of "***a transmitter coil connected to the ground by its high voltage terminal using a capacitive earth connection***", "***a subsequent receiving coil***" and the "***receiving coil being well earthed through a capacitive earth connection or conventional earth***" is specific to this group of claims.

• Claims 9-11, 24-28, and in part claims 12-13, 29-31, 47-50 are directed to a method to develop AC current and transmit power through the earth. The feature of "***single conductor power transmission/transfer system***" being used to "develop AC current" is specific to this group of claims.

• Claims 32-38 are directed to a method of forming a tuned network. The feature of "***connecting a capacitor between the at least one first coil assembly and earth, and the at least one second coil assembly and earth, such that a tuned path is formed through the earth between the at least one first coil assembly and the at least one second coil assembly" and "at least one of the at least one first coil assembly or second coil assembly is excited at a predetermined frequency***" is specific to this group of claims.

• Claims 39-40 are directed to a method of earthing oscillating coils. The feature of "***AC earth electrical currents***" being developed "***when the capacitive connection is excited with AC electrical energy***" is specific to this group of claims.

• Claims 41-46 are directed to a method for maximizing potential between a first coil and a second coil. The feature of "***exciting at least the first coil at a predetermined frequency which maximizes the voltage difference between at least a portion of the first coil and at least a portion of the second coil***" is specific to this group of claims.

PCT Rule 13.2, first sentence, states that unity of invention is only fulfilled when there is a technical relationship among the claimed inventions involving one or more of the same or corresponding special technical features. PCT Rule 13.2, second sentence, defines a special technical feature as a feature which makes a contribution over the prior art.

When there is no special technical feature common to all the claimed inventions there is no unity of invention.

In the above groups of claims, the identified features may have the potential to make a contribution over the prior art but are not common to all the claimed inventions and therefore cannot provide the required technical relationship. Therefore there is no special technical feature common to all the claimed inventions and the requirements for unity of invention are consequently not satisfied *a priori*.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU2013/000002

A. CLASSIFICATION OF SUBJECT MATTER

H02J 17/00 (2006.01) H01F 27/00 (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Searched Databases TXTUS0, TXTUS1, TXTUS2, TXTUS3, TXTUS4, TXTEP1, TXTGB1, TXTWO1 with keywords: "wireless power transfer", "capacitive grounding", "magnifying transmitter", "tuned frequency", data, information and other similar terms.

Searched Google Patents with keywords: tesla, coil, power, transmission, frequency, capacitor, distance and other similar terms.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	Documents are listed in the continuation of Box C	

[X] Further documents are listed in the continuation of Box C [X] See patent family annex

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
21 March 2013	21 March 2013

Name and mailing address of the ISA/AU	**Authorised officer**
AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA Email address: pct@ipaustralia.gov.au Facsimile No.: +61 2 6283 7999	Shuchin Taher AUSTRALIAN PATENT OFFICE (ISO 9001 Quality Certified Service) Telephone No. 0262832862

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU2013/000002

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☒ Claims Nos.: **51**
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
See Supplemental Box

3. ☐ Claims Nos:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

See Supplemental Box for Details

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:
1-8, 14-23, 32-38 and in part claims 12-13, 29-31, 47-50.

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		International application No. **PCT/AU2013/000002**
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2011/0156494 A1 (MASHINSKY) 30 June 2011 See the whole document, in particular, para. 0014-0015, 0026-0029, 0035-0036, 0038, 0040-0041 and 0045.	1-8, 12-23, 29-38, 47-50
A	US 2009/0134711 A1 (ISSA et al.) 28 May 2009 See the whole document.	

INTERNATIONAL SEARCH REPORT	International application No. PCT/AU2013/000002

Supplemental Box

Continuation of **Box II**
Claim 51 does not comply with Rule 6.2(a) because it relies on references to the description and/or drawings.

Continuation of **Box III**
This International Application does not comply with the requirements of unity of invention because it does not relate to one invention or to a group of inventions so linked as to form a single general inventive concept.

This Authority has found that there are different inventions based on the following features that separate the claims into distinct groups:

• Claims 1-8, 14-23 and in part claims 12-13, 29-31, 47-50 are directed to a wireless power transmission system. The feature of "***a transmitter coil connected to the ground by its high voltage terminal using a capacitive earth connection***", "***a subsequent receiving coil***" and the "***receiving coil being well earthed through a capacitive earth connection or conventional earth***" is specific to this group of claims.

• Claims 9-11, 24-28, and in part claims 12-13, 29-31, 47-50 are directed to a method to develop AC current and transmit power through the earth. The feature of "***single conductor power transmission/transfer system***" being used to "develop AC current" is specific to this group of claims.

• Claims 32-38 are directed to a method of forming a tuned network. The feature of "***connecting a capacitor between the at least one first coil assembly and earth, and the at least one second coil assembly and earth, such that a tuned path is formed through the earth between the at least one first coil assembly and the at least one second coil assembly" and "at least one of the at least one first coil assembly or second coil assembly is excited at a predetermined frequency***" is specific to this group of claims.

• Claims 39-40 are directed to a method of earthing oscillating coils. The feature of "***AC earth electrical currents***" being developed "***when the capacitive connection is excited with AC electrical energy***" is specific to this group of claims.

• Claims 41-46 are directed to a method for maximizing potential between a first coil and a second coil. The feature of "***exciting at least the first coil at a predetermined frequency which maximizes the voltage difference between at least a portion of the first coil and at least a portion of the second coil***" is specific to this group of claims.

PCT Rule 13.2, first sentence, states that unity of invention is only fulfilled when there is a technical relationship among the claimed inventions involving one or more of the same or corresponding special technical features. PCT Rule 13.2, second sentence, defines a special technical feature as a feature which makes a contribution over the prior art.

When there is no special technical feature common to all the claimed inventions there is no unity of invention.

In the above groups of claims, the identified features may have the potential to make a contribution over the prior art but are not common to all the claimed inventions and therefore cannot provide the required technical relationship. Therefore there is no special technical feature common to all the claimed inventions and the requirements for unity of invention are consequently not satisfied a *priori*.

INTERNATIONAL SEARCH REPORT Information on patent family members	International application No. **PCT/AU2013/000002**

This Annex lists known patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document/s Cited in Search Report		Patent Family Member/s	
Publication Number	**Publication Date**	**Publication Number**	**Publication Date**
US 2011/0156494 A1	30 Jun 2011	EP 2329505 A1	08 Jun 2011
		US 2011156494 A1	30 Jun 2011
		WO 2010024895 A1	04 Mar 2010
US 2009/0134711 A1	28 May 2009	US 2008285201 A1	20 Nov 2008
		US 7817401 B2	19 Oct 2010
		US 2009303760 A1	10 Dec 2009
		US 7940534 B2	10 May 2011
		US 2009134711 A1	28 May 2009
		US 7960867 B2	14 Jun 2011
		US 2008284506 A1	20 Nov 2008
		US 8098472 B2	17 Jan 2012
		US 2011165837 A1	07 Jul 2011
		US 8247926 B2	21 Aug 2012
		US 2008285200 A1	20 Nov 2008
		US 2009011940 A1	08 Jan 2009
		US 2011163729 A1	07 Jul 2011
		WO 2008143893 A1	27 Nov 2008
		WO 2008143938 A1	27 Nov 2008
		WO 2008156814 A1	24 Dec 2008
		WO 2009070195 A1	04 Jun 2009
		WO 2009070275 A1	04 Jun 2009

End of Annex

Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.

CLAIMS

1. A wireless power transmission system comprising:
a transmitting inverted Tesla Coil or Magnifier connected to the ground by its high voltage terminal using a capacitive earth connection and transmitting power through the ground to a subsequent receiving Tesla Coil or Magnifier being well earthed through a capacitive earth connection or conventional earth with the distance between the two earth connections of the transmitter and receiver plus the length of the coils in the transmitter and receiver forming a tuned length and the system thus composed being operated at a frequency that is an harmonic or close to an harmonic of the tuned length thus established.

2. A system as claimed in 1 where the inverted Tesla coil or Magnifier has a large capacitance on an elevated terminal which becomes a high current low-voltage node and is used as the neutral side during power transmission.

3. A system claimed in 1 where the coils are caused to impress voltage through their high voltage terminal onto the ground through air separation or using any of the capacitive earthing devices mentioned in the text or shown in the drawings hereto or any other efficacious capacitive connection method.

4. A system as claimed in claim 1 where the transmitting inverted Tesla Coil or Magnifier is brought into resonance with a second receiving Tesla Coil or Magnifier to maximize the amount of energy available in the receiving Tesla Coil or Magnifier.

5. A system as claimed in claim 4 where additional Tesla Coils or Magnifiers are added for transmission and reception of power by having each of them being located in a triangular grid pattern so that the transmitters and receivers that are within range of each other all use the same frequency or a harmonic of each others frequency augmenting the action of the other transmitters and receivers.

6. A system as claimed in claim 5 where longer distance transmission is achieved by using lower frequencies.

7. A system as claimed in claim 5 where shorter distance transmission is achieved by using higher frequencies

8. A system as claimed in claim 6 and 7 where the frequencies used for longer or shorter distances are an harmonic of one another.

9. A system where the method of single conductor power transmission is used to develop AC current and subsequently transmit the power through the earth to a receiver so that the energy at the receiver is rendered useable.

10. A system where an oscillating LCR or LC circuit of any description is used to develop AC current which is transmitted through the earth to a receiver using an LCR or LC circuit of any description as a single conductor power transfer system with which to transmit power wirelessly from one location to another using the earth as a single conductor to do so.

11. A system as claimed in claim 9 or 10 where the LCR or LC circuit of the transmitter and the LCR or LC circuit of the receiver is brought into resonance with each other.

12. A system claimed in any previous claim where more than one power transmission and reception system may operate contemporaneously with another power transmission and reception system and not interfere with one another as each system is built to operate at a different discrete frequency so that neither power transmission system interferes with the operation of the other allowing discrete power generation and transmission to occur to allow commercial competition.

13. A system claimed in any previous claim where power transmission on discrete frequencies is allocated to transmission and receiving power stations so that civilian power may run on one frequency and the defence forces may run on another frequency so that in the event that the civilian power grid goes down, the defence power grid still remains in tact.

14. A wireless power transmission system comprising:
a transmitter coil connected to the ground by its high voltage terminal using a capacitive earth connection and transmitting power through the ground to a subsequent receiving coil;
the subsequent receiving coil being well earthed through a capacitive earth connection or conventional earth.

15. The system of claim 14, wherein with the distance between the earth connection of the transmitter coil and the earth connection of the receiving coil plus the length of the coils in the

transmitter and receiver forming a tuned length and the system thus composed being operated at a frequency that is an harmonic or close to an harmonic of the tuned length thus established.

16. The system of claim 14 or 15 wherein the transmitter coil has a large capacitance on an elevated terminal which becomes a high current low-voltage node and is used as the neutral side during power transmission.

17. The system of any one of claims 14 to 16 wherein the coils are caused to impress voltage through their high voltage terminal onto the ground.

18. The system of claim any one of claims 14 to 18 wherein the transmitting coil is brought into resonance with the receiving coil to maximize the amount of energy available in the receiving coil.

19. The system of claim any one of claims 14 to 18 further including at least one additional coil for transmission and reception of power wherein the at least one additional coil is located in a triangular grid pattern so that the transmitter coil and receiver coil that are within range of each other all use the same frequency or a harmonic of each others frequency augmenting the action of the other transmitters and receivers.

20. The system of claim any one of claims 14 to 19 wherein longer distance transmission is achieved by using lower frequencies.

21. The system of claim any one of claims 14 to 19 where shorter distance transmission is achieved by using higher frequencies.

22. The system of claim 20 wherein the frequencies used for the longer distances are an harmonic of one another and of the shorter distance frequencies.

23. The system of claim 21 wherein the frequencies used for shorter distances are an harmonic of one another and of the longer distance frequencies.

24. A wireless power transmission system wherein single conductor power transmission is used to develop AC current and subsequently transmit power through the earth to a receiver so that the energy at the receiver is rendered useable.

25. The system of claim 24 wherein the oscillating LCR or LC circuit of the transmitter and the LCR or LC circuit of the receiver is brought into resonance with each other.

26. A wireless power transmission system wherein an oscillating LCR or LC circuit is used to develop AC current which is transmitted through the earth to a receiver using an LCR or LC circuit as a single conductor power transfer system with which to transmit power wirelessly from one location to another using the earth as a single conductor to do so.

27. The system of claim 26 further including at least one capacitive connection associated with an earth connection.

28. The system of claim 26 or 27 wherein the oscillating LCR or LC circuit of the transmitter and the LCR or LC circuit of the receiver is brought into resonance with each other.

29. A system claimed in any previous claim where more than one power transmission and reception system may operate contemporaneously with another power transmission and reception system and not interfere with one another as each system is built to operate at a different discrete frequency so that neither power transmission system interferes with the operation of the other allowing discrete power generation and transmission to occur to allow commercial competition.

30. A system claimed in any previous claim where power transmission on discrete frequencies is allocated to transmission and receiving power stations so that civilian power may run on one frequency and the defence forces may run on another frequency so that in the event that the civilian power grid goes down, the defence power grid still remains in tact.

31. A system claimed in any previous claim wherein once the carrier wave is established in the earth between two points, the wave can then be overlaid with data signals using frequencies that are higher or lower harmonics of the carrier frequency whereby the system may be used for Data, signal, voice Transmission as well as power transmission.

32. A method of forming a tuned network from at least one first coil assembly and an at least one second coil assembly; the method comprising:
connecting a capacitor between the at least one first coil assembly and earth, and the at least one second coil assembly and earth, such that a tuned path is formed through the earth between the at

least one first coil assembly and the at least one second coil assembly, when at least one of the at least one first coil assembly or second coil assembly is excited at a predetermined frequency.

33. The method of claim 32, wherein the capacitor is formed from a first metal plate and at least a second metal plate.

34. The method of claim 33, wherein the first metal plate is formed as a substantially closed volume.

35. The method of claim 34, wherein the substantially closed volume is a sphere.

36. The method of claim 32 or 34 wherein the first metal plate is substantially enclosed by the second metal plate.

37. The method of any one of claims 32 to 36 wherein the second plate is located within the earth.

38. The method of any one of claims 31 to 37 wherein the first plate is located at or near an earth/air interface.

39. A method of earthing oscillating coils through a capacitive connection to the earth so that AC earth electrical currents will be developed when the capacitive connection is excited with AC electrical energy.

40. The method of claim 39 wherein a plurality of oscillating coils are used as transmitters, then electrical currents flow between the connections facilitating wireless power transmission through the ground where the currents are available to be accessed by receivers and converted to useable energy.

41. A method of maximizing potential between a first coil connected capacitively to a first earth terminal and a second coil connected capacitively to a second earth terminal; the first earth terminal spaced from the second earth terminal; the method including the step of:

exciting at least the first coil at a predetermined frequency which maximizes the voltage difference between at least a portion of the first coil and at least a portion of the second coil.

42. The method of any one of claims 32 to 41 wherein once a carrier wave is established in the earth between two points, the wave is then overlaid with data signals using frequencies that are higher or lower harmonics of the carrier frequency whereby the system may be used for Data, signal, voice Transmission as well as power transmission.

43. The method of any one of claims 32 to 42 wherein once a carrier wave is established in the earth between two points, the wave is then overlaid or varied to induce data signals for transmission thereover.

44. The method of claim 43 wherein the wave is overlaid using any method of Frequency Modulation, Frequency Shift Keying, Encoding or any other technology currently extant whereby the system may be used for Data, signal, voice Transmission as well as power transmission.

45. The method of claim 43 or 44 wherein once the carrier wave is established in the earth between points then the frequency may be varied using a pre-programmed input.

46. The method of claim 45 wherein the pre-programmed input frequently shifts the frequency of transmission thereby making it very difficult to tune into the system with a receiver, unless one has access to the pre-programmed transmission frequency input sequence so that the next frequency shift can be anticipated and tuned synchronously with the tuning shift in the transmitter.

47. A wireless power transmission system as claimed in any one of claims 1 to 31 wherein once a carrier wave is established in the earth between two points, the wave is then overlaid or varied to induce data signals for transmission thereover.

48. The system of claim 47 wherein the wave is overlaid using any method of Frequency Modulation, Frequency Shift Keying, Encoding or any other technology currently extant whereby the system may be used for Data, signal, voice Transmission as well as power transmission.

49. The system of claim 47 or 48 wherein once the carrier wave is established in the earth between points then the frequency may be varied using a pre-programmed input.

50. The system of claim 49 wherein the pre-programmed input frequently shifts the frequency of transmission thereby making it very difficult to tune into the system with a receiver, unless one

has access to the pre-programmed transmission frequency input sequence so that the next frequency shift can be anticipated and tuned synchronously with the tuning shift in the transmitter.

51. A system of wireless transmission that may be constructed with reference to the drawings and/or descriptions and information contained in the body of this document.

IN THE CANADIAN PATENT OFFICE

To: The Commissioner of Patents

September 17, 2014

Title: **SYSTEM FOR WIRELESS DISTRIBUTION OF POWER**
Applicant: **HOWARD, Keith Maxwell**
Our File: **PAT 92524W-1**

VOLUNTARY AMENDMENT

Concurrent with National Phase Entry of the above Application as of today's date, Applicant requests entry of the following Voluntary Amendment. Please amend the Application as follows:

IN THE CLAIMS

Please replace current claims 1-68, pages 21-31, with amended claims 1-93, pages 21-34, submitted herewith.

REMARKS

Entry of the amendment is respectfully requested.

The Applicant submits claims 1 to 93 for examination. Claims 69-93 are new claims supported by the original specification.

Should this application be abandoned for any reason, please regard this as the request(s) for reinstatement. Should the fees submitted with this letter be insufficient to cover all of the fees for which payment is explicitly or implicitly requested by this letter, or needed to reinstate the application, the Commissioner is authorized to charge the amount of the insufficiency to our deposit account number 600000247 or deposit account number 600001646.

Yours very truly

Borden Ladner Gervais LLP / s.r.l.
Agents

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Encls.
1. Claims 1-93 (Pages 21-34)

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CLAIMS

1. A wireless power transmission system comprising:
a transmitting inverted Tesla Coil or Magnifier connected to the ground by its high voltage terminal using a capacitive earth connection and transmitting power through the ground to a subsequent receiving Tesla Coil or Magnifier being well earthed through a capacitive earth connection or conventional earth with the distance between the two earth connections of the transmitter and receiver plus the length of the coils in the transmitter and receiver forming a tuned length and the system thus composed being operated at a frequency that is an harmonic or close to an harmonic of the tuned length thus established.

2. A system as claimed in 1 where the inverted Tesla coil or Magnifier has a large capacitance on an elevated terminal which becomes a high current low-voltage node and is used as the neutral side during power transmission.

3. A system claimed in 1 where the coils are caused to impress voltage through their high voltage terminal onto the ground through air separation or using any of the capacitive earthing devices mentioned in the text or shown in the drawings hereto or any other efficacious capacitive connection method.

4. A system as claimed in claim 1 where the transmitting inverted Tesla Coil or Magnifier is brought into resonance with a second receiving Tesla Coil or Magnifier to maximize the amount of energy available in the receiving Tesla Coil or Magnifier.

5. A system as claimed in claim 4 where additional Tesla Coils or Magnifiers are added for transmission and reception of power by having each of them being located in a triangular grid pattern so that the transmitters and receivers that are within range of each other all use the same frequency or a harmonic of each others frequency augmenting the action of the other transmitters and receivers.

6. A system as claimed in claim 5 where longer distance transmission is achieved by using lower frequencies.

7. A system as claimed in claim 5 where shorter distance transmission is achieved by using higher frequencies.

8. A system as claimed in claim 6 and 7 where the frequencies used for longer or shorter distances are an harmonic of one another.

9. A system where the method of single conductor power transmission is used to develop AC current and subsequently transmit the power through the earth to a receiver so that the energy at the receiver is rendered useable.

10. A system where an oscillating LCR or LC circuit of any description is used to develop AC current which is transmitted through the earth to a receiver using an LCR or LC circuit of any description as a single conductor power transfer system with which to transmit power wirelessly from one location to another using the earth as a single conductor to do so.

11. A system as claimed in claim 9 or 10 where the LCR or LC circuit of the transmitter and the LCR or LC circuit of the receiver is brought into resonance with each other.

12. A system claimed in any previous claim where more than one power transmission and reception system may operate contemporaneously with another power transmission and reception system and not interfere with one another as each system is built to operate at a different discrete frequency so that neither power transmission system interferes with the operation of the other allowing discrete power generation and transmission to occur to allow commercial competition.

13. A system claimed in any previous claim where power transmission on discrete frequencies is allocated to transmission and receiving power stations so that civilian power may

run on one frequency and the defence forces may run on another frequency so that in the event that the civilian power grid goes down, the defence power grid still remains in tact.

14. A wireless power transmission system comprising:
a transmitter coil connected to the ground by its high voltage terminal using a capacitive earth connection and transmitting power through the ground to a subsequent receiving coil;
the subsequent receiving coil being well earthed through a capacitive earth connection or conventional earth.

15. The system of claim 14, wherein with the distance between the earth connection of the transmitter coil and the earth connection of the receiving coil plus the length of the coils in the transmitter and receiver forming a tuned length and the system thus composed being operated at a frequency that is an harmonic or close to an harmonic of the tuned length thus established.

16. The system of claim 14 or 15 wherein the transmitter coil has a large capacitance on an elevated terminal which becomes a high current low-voltage node and is used as the neutral side during power transmission.

17. The system of any one of claims 14 to 16 wherein the coils are caused to impress voltage through their high voltage terminal onto the ground.

18. The system of claim any one of claims 14 to 18 wherein the transmitting coil is brought into resonance with the receiving coil to maximize the amount of energy available in the receiving coil.

19. The system of claim any one of claims 14 to 18 further including at least one additional coil for transmission and reception of power wherein the at least one additional coil is located in a triangular grid pattern so that the transmitter coil and receiver coil that are within range of each other all use the same frequency or a harmonic of each others frequency augmenting the action of the other transmitters and receivers.

20. The system of claim any one of claims 14 to 19 wherein longer distance transmission is achieved by using lower frequencies.

21. The system of claim any one of claims 14 to 19 where shorter distance transmission is achieved by using higher frequencies.

22. The system of claim 20 wherein the frequencies used for the longer distances are an harmonic of one another and of the shorter distance frequencies.

23. The system of claim 21 wherein the frequencies used for shorter distances are an harmonic of one another and of the longer distance frequencies.

24. A wireless power transmission system wherein single conductor power transmission is used to develop AC current and subsequently transmit power through the earth to a receiver so that the energy at the receiver is rendered useable.

25. The system of claim 24 wherein the oscillating LCR or LC circuit of the transmitter and the LCR or LC circuit of the receiver is brought into resonance with each other.

26. A wireless power transmission system wherein an oscillating LCR or LC circuit is used to develop AC current which is transmitted through the earth to a receiver using an LCR or LC circuit as a single conductor power transfer system with which to transmit power wirelessly from one location to another using the earth as a single conductor to do so.

27. The system of claim 26 further including at least one capacitive connection associated with an earth connection.

28. The system of claim 26 or 27 wherein the oscillating LC or LC circuit of the transmitter and the LCR or LC circuit of the receiver is brought into resonance with each other.

29. A system claimed in any previous claim where more than one power transmission and reception system may operate contemporaneously with another power transmission and reception system and not interfere with one another as each system is built to operate at a different discrete frequency so that neither power transmission system interferes with the operation of the other allowing discrete power generation and transmission to occur to allow commercial competition.

30. A system claimed in any previous claim where power transmission on discrete frequencies is allocated to transmission and receiving power stations so that civilian power may run on one frequency and the defence forces may run on another frequency so that in the event that the civilian power grid goes down, the defence power grid still remains in tact.

31. A system claimed in any previous claim wherein once the carrier wave is established in the earth between two points, the wave can then be overlaid with data signals using frequencies that are higher or lower harmonics of the carrier frequency whereby the system may be used for Data, signal, voice Transmission as well as power transmission.

32. A method of forming a tuned network from at least one first coil assembly and an at least one second coil assembly; the method comprising :
connecting a capacitor between the at least one first coil assembly and earth, and the at least one second coil assembly and earth, such that a tuned path is formed through the earth between the at least one first coil assembly and the at least one second coil assembly, when at least one of the at least one first coil assembly or second coil assembly is excited at a predetermined frequency.

33. The method of claim 32, wherein the capacitor is formed from a first metal plate and at least a second metal plate.

34. The method of claim 33, wherein the first metal plate is formed as a substantially closed volume.

35. The method of claim 34, wherein the substantially closed volume is a sphere.

36. The method of claim 32 or 34 wherein the first metal plate is substantially enclosed by the second metal plate.

37. The method of any one of claims 32 to 36 wherein the second plate is located within the earth.

38. The method of any one of claims 31 to 37 wherein the first plate is located at or near an earth/air interface.

39. A method of earthing oscillating coils through a capacitive connection to the earth so that AC earth electrical currents will be developed when the capacitive connection is excited with AC electrical energy.

40. The method of claim 39 wherein a plurality of oscillating coils are used as transmitters, then electrical currents flow between the connections facilitating wireless power transmission through the ground where the currents are available to be accessed by receivers and converted to useable energy.

41. A method of maximizing potential between a first coil connected capacitively to a first earth terminal and a second coil connected capacitively to a second earth terminal; the first earth terminal spaced from the second earth terminal; the method including the step of :

exciting at least the first coil at a predetermined frequency which maximizes the voltage difference between at least a portion of the first coil and at least a portion of the second coil.

42. The method of any one of claims 32 to 41 wherein once a carrier wave is established in the earth between two points, the wave is then overlaid with data signals using frequencies that are higher or lower harmonics of the carrier frequency whereby the system may be used for Data, signal, voice Transmission as well as power transmission.

43. The method of any one of claims 32 to 42 wherein once a carrier wave is established in the earth between two points, the wave is then overlaid or varied to induce data signals for transmission thereover.

44. The method of claim 43 wherein the wave is overlaid using any method of Frequency Modulation, Frequency Shift Keying, Encoding or any other technology currently extant whereby the system may be used for Data, signal, voice Transmission as well as power transmission .

45. The method of claim 43 or 44 wherein once the carrier wave is established in the earth between points then the frequency may be varied using a pre-programmed input.

46. The method of claim 45 wherein the pre-programmed input frequently shifts the frequency of transmission thereby making it very difficult to tune into the system with a receiver, unless one has access to the pre-programmed transmission frequency input sequence so that the next frequency shift can be anticipated and tuned synchronously with the tuning shift in the transmitter.

47. A wireless power transmission system as claimed in any one of claims 1 to 31 wherein once a carrier wave is established in the earth between two points, the wave is then overlaid or varied to induce data signals for transmission thereover.

48. The system of claim 47 wherein the wave is overlaid using any method of Frequency Modulation, Frequency Shift Keying, Encoding or any other technology currently extant whereby the system may be used for Data, signal, voice Transmission as well as power transmission.

49. The system of claim 47 or 48 wherein once the carrier wave is established in the earth between points then the frequency may be varied using a pre-programmed input.

50. The system of claim 49 wherein the pre-programmed input frequently shifts the frequency of transmission thereby making it very difficult to tune into the system with a receiver, unless one has access to the pre-programmed transmission frequency input sequence so that the next frequency shift can be anticipated and tuned synchronously with the tuning shift in the transmitter.

51. A system of wireless transmission that may be constructed with reference to the drawings and/or descriptions and information contained in the body of this document.

52. A coil structure for low impedance transmission of electrical current; said structure comprising

a first coil set comprising a first conductor having a first end and a second end; said first conductor wound around a first core in a first direction;

said structure further comprising a second coil set comprising a second conductor having a first end and a second end; said second conductor wound around a second core in a second direction;

said structure further comprising a primary coil;

said first coil set oriented with respect to said second coil set so that when the coils are in operation the magnetic field generated by one coil is off set by the magnetic field in the other coil set thereby substantially nullifying the F magnetic output of the said one coil; said primary coil comprising a conductor having a first end and a second end;

the conductor of said primary coil wound in a first direction around said first coil set;

the conductor of said primary coil wound in a second direction around said second coil set

thereby to improve efficiency of transmission of electrical power through a medium located between like coil structures.

53. The coil structure of Claim 52 wherein the first coil set is wound as a secondary coil in electrical communication with a tertiary coil.

54. The coil structure of Claim 52 or 53 wherein said second coil set is wound as a secondary coil in electrical communication with a tertiary coil.

55. The coil structure of any one of claims 52 to 54 wherein said second direction is an opposite direction of winding compared to the first direction.

56. A wireless power transmission system comprising a transmitting Tesla Coil ox Magnifier connected to the ground being well earthed and transmitting power through the ground to a subsequent receiving Tesla Coil or Magnifier also being well earthed with the distance between the two earths of the Tesla Coils or Magnifiers plus the length of the coils connected to earth in the transmitter and receiver forming a tuned length and the system thus composed being operated at a frequency that is an harmonic of the tuned length thus established.

57. A system as claimed in claim 56 where the transmitting Tesla Coil or Magnifier is brought into resonance with a second receiving Tesla Coil or Magnifier to maximize the amount of energy available in the receiving Tesla Coil or Magnifier.

58. A system as claimed in claims 56 or 57 where additional Tesla Coils or Magnifiers are added for transmission and reception of power by having each of them being located in a triangular grid pattern so that the transmitters, and receivers that are within range of each other all use the same freguency or a harmonic of each others frequency thereby augmenting the action of the other transmitters and receivers.

59. A system as claimed in claim 58 where longer distance transmission is achieved by using lower frequencies.

60. A system as claimed in claim 58 where shorter distance transmission is achieved by using higher frequencies.

61. A system as claimed in claim 8 or 9 where the frequencies used for longer or shorter distances are an harmonic of one another.

62. A system where the method of single conductor power transmission is used to develop AC current and subsequently transmit the power through the earth to a receiver so that the energy at the receiver is rendered useable.

63. A system where an oscillating LCR or LC circuit of any description is used to develop AC current which is transmitted through the earth to a receiver using an LCR or LC circuit of any description as a single conductor power transfer system with which to transmit power wirelessly from one location to another using the earth as a single conductor to do so.

64. A system as claimed in claim 63 where the LCR or LC circuit of the transmitter and the LCR or LC circuit of the receiver is brought into resonance with each other.

65. A system as claimed in any one of claims 56 to 64 where multiple counter wound coils are used to reduce magnetic radiation emissions from the resonating coil system.

66. A system as claimed in any one of claims 56 to 65 where multiple counter wound coils are brought within close proximity to each other to vary both the capacitance and inductance or are moved apart to vary both the capacitance and inductance in the coil system for tuning purposes.

67. A system as claimed in any one of claims 56 to 66 where more than one power transmission and reception system may operate contemporaneously with another power transmission and reception system and not interfere with one another as each system transmits electrical power utilizing transmission waves at a different discrete frequency so that neither power transmission system interferes with the operation of the other allowing discrete power generation and transmission to occur to allow commercial competition.

68. A system as claimed in any one of claims 56 to 67 where power transmission on discrete frequencies is allocated to transmission and receiving power stations so that civilian power may run on one frequency and the defence forces may run on another frequency so that in the event that the civilian power grid goes down, the defence power grid still remains intact.

69. An AC power transmission system comprising:
a transmitting coil connected to the ground using a capacitive earth connection buried in the ground located between the coil and the ground and transmitting power through the ground through the capacitive connection to a subsequent receiving coil which is well earthed through a capacitive earth connection buried in the ground or conventional earth connection with the distance between the two earth connections of the transmitter and receiver plus the length of the coils in the transmitter and receiver forming a tuned length and the system thus composed being operated at a frequency having a wavelength that is an harmonic or close to an harmonic of the tuned length thus established.

70. A system as claimed in claim 69 where the transmitting coil has a large capacitance on an elevated terminal and is used as the neutral side during power transmission.

71. A system as claimed in claim 69 where the transmitting coil is caused to impress voltage into the ground through buried capacitive earthing devices.

72. A system as claimed in claim 69 where the transmitting coil is brought into resonance with the second receiving coil to maximize the amount of energy available in the receiving coil.

73. A system as claimed in claim 72 where additional coils are added for transmission and reception of power by having each of them being located in a triangular grid pattern so that the transmitters and receivers that are within range of each other all use the same frequency or a harmonic of each other's frequency augmenting the action of the other transmitters and receivers.

74. The system of any previous claim, wherein the capacitor is formed from a first metal plate and at least a second metal plate.

75. The system of claim 74, wherein the first metal plate is formed as a substantially closed volume.

76. The system of claim 75, wherein the substantially closed volume is a sphere.

77. The system of claim 74, 75, or 76 wherein the first metal plate is substantially enclosed by the second metal plate.

78. The system of any one of claims 74 to 77 wherein the first and second plate ~~is~~ are located within the earth.

79. The system of any one of claims 74 to 78 wherein the first plate is located at or near an earth/air interface.

80. The system of any previous claim wherein the capacitive earth connection is buried substantially in the earth.

81. The system of any previous claim wherein the capacitive earth connection is buried entirely in the earth.

82. A method of transmitting AC power through the earth between at least one first coil assembly and an at least one second coil assembly; said method including forming a tuned network from said at least one first coil assembly and said at least one second coil assembly; the method further comprising:
connecting a substantially capacitor between the at least one first coil assembly and earth;
connecting the at least one second coil assembly and earth ; such that a tuned path is formed through the earth between the at least one first coil assembly and the at least one second coil

assembly when the at least one first coil assembly is excited at a predetermined frequency; whereby AC power is transmitted through the capacitor and through the earth from the at least one first coil assembly to the at least one second coil assembly.

83. The method as claimed in claim 82 where the transmitting coil has a large capacitance on an elevated terminal and is used as the neutral side during power transmission.

84. The method as claimed in claim 82 where the transmitting coil is caused to impress voltage into the ground through buried capacitive earthing devices.

85. The method as claimed in claim 82 where the transmitting coil is brought into resonance with the second receiving Coil to maximize the amount of energy available in the receiving coil.

86. The method as claimed in claim 85 where additional coils are added for transmission and reception of power by having each of them being located in a triangular grid pattern so that the transmitters and receivers that are within range of each other all use the same frequency or a harmonic of each other's frequency augmenting the action of the other transmitters and receivers.

87. The method of claim 82, wherein the buried capacitor is formed from a first metal plate and at least a second metal plate.

88. The method of claim 87, wherein the first metal plate is formed as a substantially closed volume.

89. The method of claim 88, wherein the substantially closed volume is a sphere.

90. The method of claim 87, 88 or 89 wherein the first metal plate is substantially enclosed by the second metal plate.

91. The method of any one of claims 87 to 90 wherein the first and second plate are located within the earth.

92. The method of any one of claims 82 to 91 wherein the capacitive earth connection is buried substantially in the earth.

93. The method of any one of claims 82 to 91 wherein the capacitive earth connection is buried entirely in the earth.

Fig. 1

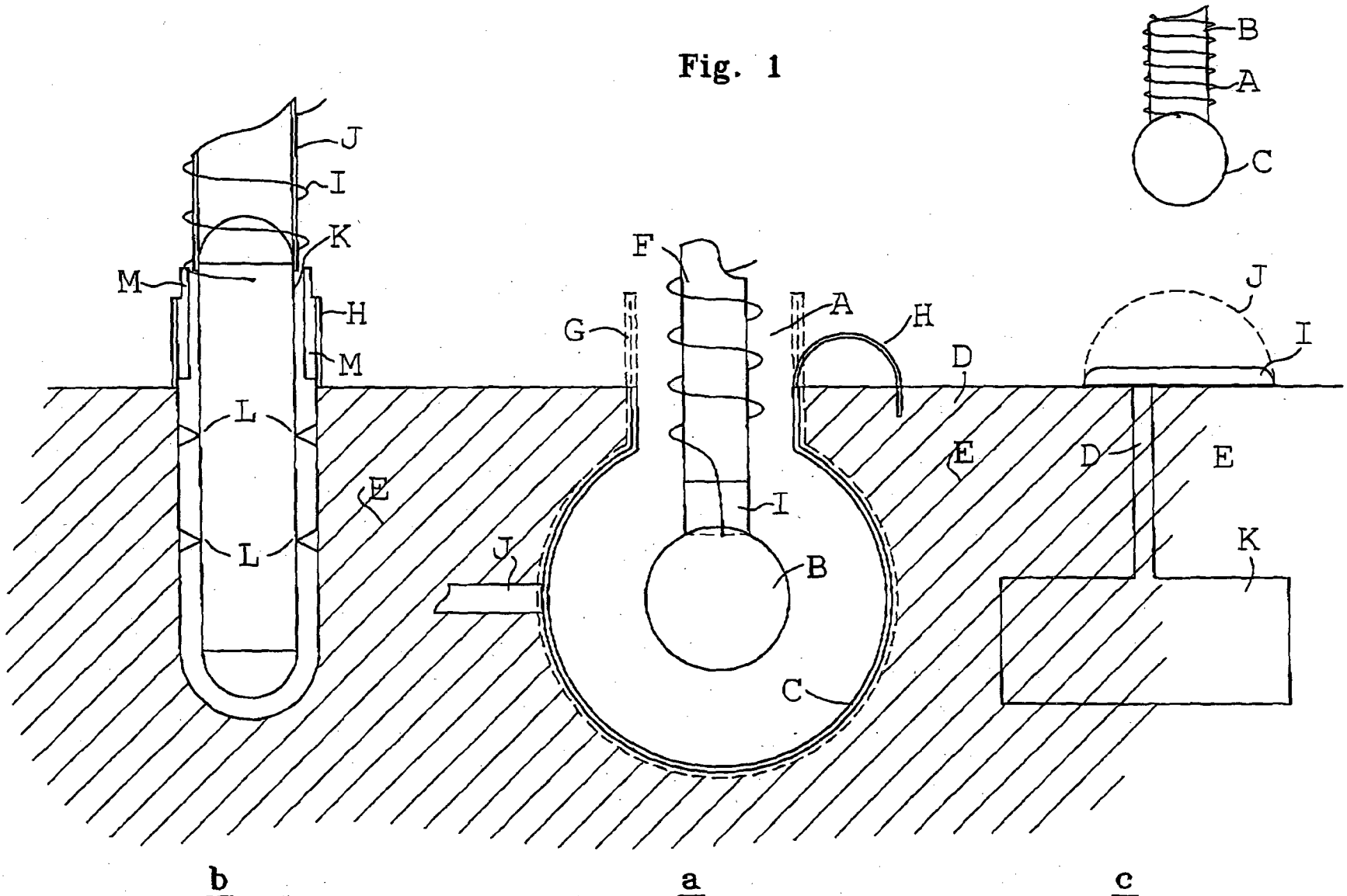

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Table composée de 2 rangée(s) et de 3 colonne(s). / Table with 2 row(s) and 3 column(s).

No de document / Document No.	Description / Description	Taxes / Fees
2867602	SYSTEM FOR WIRELESS DISTRIBUTION OF POWER Taxes de maintien - Demande / Maintenance Fee - Application année(s)/year(s): 3 Numéro PCT / PCT Number: AU2013000002 Numéro de référence / Reference Number: PAT 92524W-1	$ 100.00

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